Automotive Service Digest

Our 46th year

February, 1958

The Los Angeles-Hollywood Freeway Interchange

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for original equipment
and replacement service
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PERFECT CIRCLE PISTON RINGS

PERMATEX PETE AND SUPER '300' SAVE THE DAY

REGULAR SEALANTS JUST DON'T HOLD THESE NEW TRANSMISSION FLUIDS. BUT I KNOW WHAT WILL!
THERE'S THE LEAK. SHOULD HAVE USED SUPER '300' TO SEAL THAT HOUSING.

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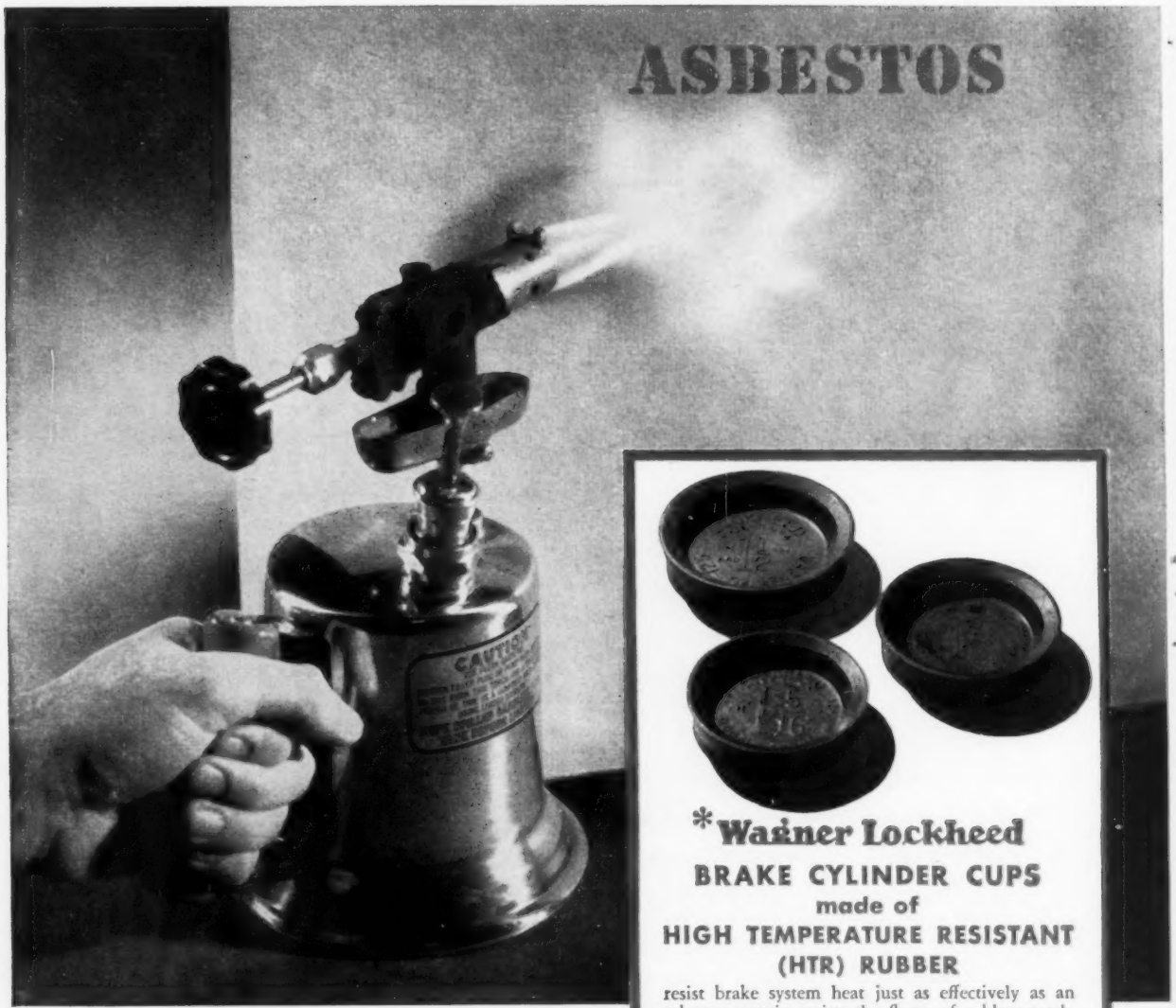
Can the brake cylinder cups you in modern braking?...



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made of
HIGH TEMPERATURE RESISTANT
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resist brake system heat just as effectively as an asbestos curtain resists the flame of a blow torch.

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keep their shape and seal even under highest operating temperatures

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WAGNER RESEARCH disclosed that materials generally used in the manufacture of brake cylinder cups were approaching top safe operating conditions—were losing important physical properties, with resultant softening and lip collapse. When this happens, leakage results. This deterioration can only partially be overcome with expanders. Alert to the needs of modern braking requirements—Wagner Engineers developed new High Temperature Resistant (HTR) compounds for the repairman. All Wagner Lockheed master and wheel cylinder cups are now furnished in the new HTR compound designs.

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CUP LIP TENSION and rigidity of HTR cups afford positive action—lengthen cup life. These cups are dimensionally accurate—100% factory inspected.

IMPROVE YOUR BRAKE JOBS by using genuine Wagner Lockheed HTR cups. They prevent leakage, give a safer, more durable job—and help cut down expensive "comebacks" on brake jobs. Furnished in assortments, cylinders, repair kits and individually.

You'll also gain by standardizing on Wagner Lockheed brake cylinders, pistons, springs, boots, hose, brake fluid and brake lining. This complete top quality line is quickly available to you through a source near you.

WP58-2

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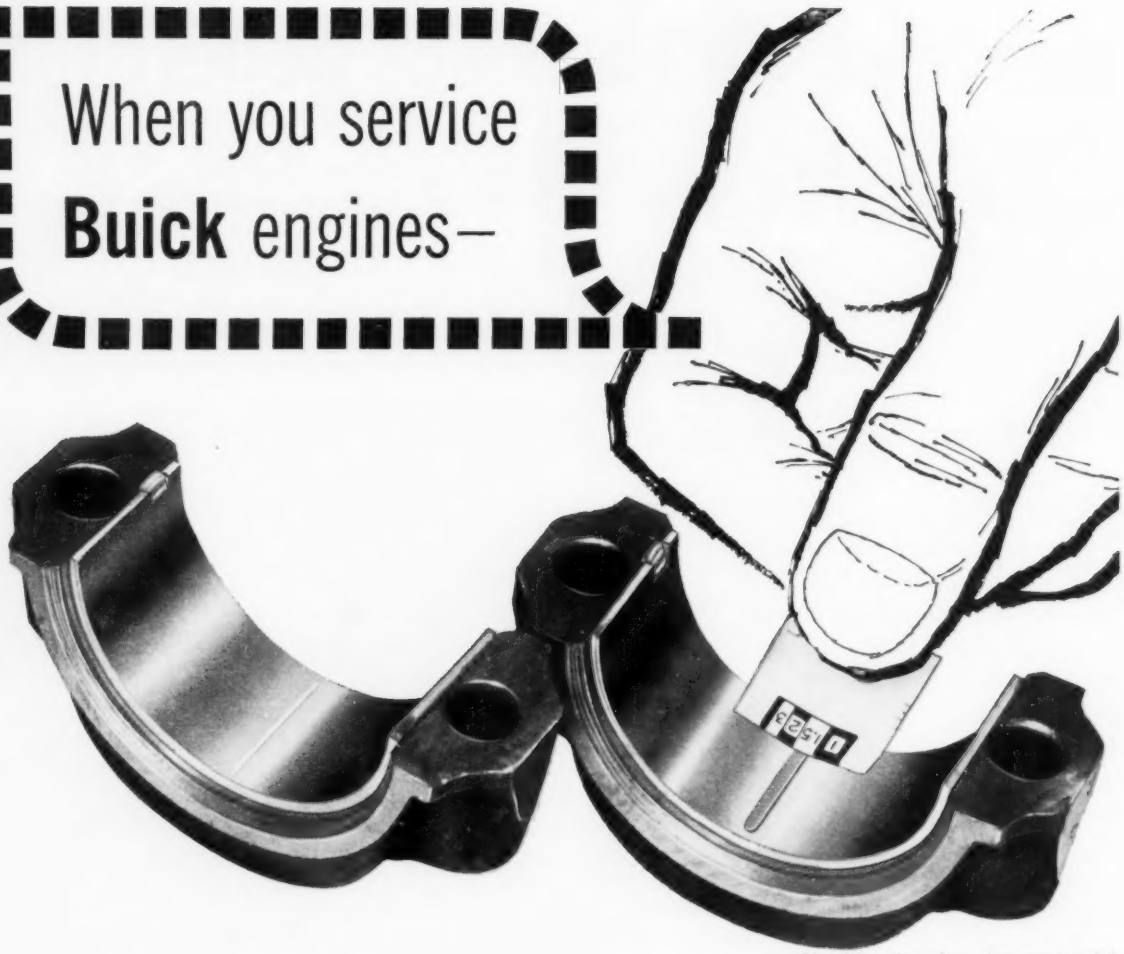
When you service **Buick** engines–



Checking bearing clearance with Plastigage – Procedure 2-17-B in the Buick Chassis Service Manual

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He stocks Factory Engineered bearings, pistons, piston rings, rods and other engine parts to take care of *all* Buicks–whether your shop, or his own shop handles their servicing.

His Service Manual also shows time-saving, tested installation methods that insure satisfactory results – the first time.

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Did You Know that the new Buick disposable air filter has a dust-filtering efficiency of over 98% and is easily removed for periodic cleaning?

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Published and printed monthly at Chicago, Ill., by Automotive Service Digest, a division of National Market Reports, Inc., 900 So. Wabash Ave., Chicago 5, Ill.

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Subscriptions: $4.00 for 1 year, $6.00 for 2 years, U.S. Possessions and Canada. Single copies 40c. Back copies 75c ea. Foreign subscriptions $5.00 per year. Second class mail privileges authorized at Chicago, Ill. Copyright 1958 by National Market Reports, Inc.

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VOLUME XXXXVI
No. 553

Automotive Service Digest

February 1958

Cover

The view is looking Easterly along Hollywood freeway toward the Los Angeles Civic Center. A 4-level interchange is shown in the foreground. (Photo courtesy, State Department Public Works, Sacramento, Calif.)

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SYMBOLIZES A.S.D.
"TECH KNOW-HOW"
FEATURE ARTICLES

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For March

● Coming up in the March issue will be a full discussion, from every angle, on dry air filters. Included will be the engineering reasons behind such units, their development, why they are effective in doing their important work and what the shopman must know in servicing them.

● Been following the series on automatic transmissions? We're sure you have, and we know you will not want to miss the full story on servicing the Fordomatic in the March issue. It will give you the low-down on construction features and service pointers.

● So you're going to start a service business? That may not be the exact title of the article planned for next month, but the article is going to prove beneficial and helpful in pointing out the many things to consider besides being able to do a valve job or line up a front end. We feel this article will be one of the best that has appeared in A.S.D.

Automotive clinic

Stuck on some problem? Need help on a job? Write us about your problem on your shop letterhead and the information you are looking for will be promptly sent you.

Address your letter to Automotive Clinic c/o AUTOMOTIVE SERVICE DIGEST, 900 S. Wabash Ave., Chicago 5, Ill.

Ben Ikert, Editor

Setting Tappets Cold

On some of the late model 6-cylinder cars equipped with L-heads, the valve clearance given by the factory is generally given as "hot." Can a mechanic adjust the clearance "cold" by increasing the amount of clearance given for the "hot" setting? For example, a 1953 Plymouth Six calls for a clearance of .010" "hot." How much more clearance would you give these valves when setting them "cold"?

On some cars it is rather difficult to adjust the valves when they are hot, as it is so hard to get to them. Any advice you can give will be appreciated.—*G.A., Almont, Colo.*

Answer: We know that adjusting valves on L-head engines when the engine is hot is a mean job that can lead to burned hands and bad temper.

To adjust them cold, we would allow about .003" on the exhaust valves and .002" on the intakes. These values would be safe. If the engine should run a little too noisy due to too much clearance, you could reduce the cold allowance by .001" in each case, though our experience has been the allowances given here will be pretty close.

No Performance

I have a 1956 Olds 88 in my shop which surges (or feels like cutting out) at speeds below 50 m.p.h. In fact, it has exploded several times enough to blow oil out of the air cleaner.

A thorough check of the ignition and carburetion system has not disclosed the cause of this trouble, and before I go any further, I would appreciate any suggestions you would like to offer.

The car has good pickup and top speed, and gasoline mileage is 19 m.p.g. at 50 m.p.h.—*G.G., Robbinsdale, Minn.*

Answer: The poor performance could be from a valve that hangs open occasionally, a hydraulic tappet that does not have the proper leak down rate and pumps up too high, cross firing in the distributor or in the high tension wiring or even dwell that is slightly too great.

You might try filing off 1/32" of the leading edge of the distributor rotor, as we have known of similar cases where this has helped. Also check for high resistance in the ignition circuit, and air leaks around the intake manifold and the intake valves.

If there is an oscilloscope available in your town, you can get a sensitive check on the ignition system, which may tell you something about the cause of the trouble.

Loose Valve Seat Inserts

As engine rebuilders (we do no installation work) we are having quite a problem with a six cylinder Ford truck engine; namely, an 8MTH, 256 cu.in., 1953 model.

This particular truck has had four engines in about 20,000 miles. At about 4,000 miles the valve seats come out on either three or four cylinders. Sometimes the block cracks, and then again it doesn't. We have rebuilt engines for this truck with painstaking care as to all specifications, and feel positive that the engine is perfect.

As to installation, our customer (a Ford Dealer with a very good service reputation) has checked the exhaust system, intake manifolds, carburetion, fuel system, ignition system and cooling system most thoroughly. One of our men even went out to make an inspection of this job, and he found everything to be satisfactory. To us it does not seem to be an overheating condition. The head has been torqued to specifications, and retorqued.

This engine is in a milk truck and travels about two hundred miles a day down in the Ozark country, probably making from 15 to 20 stops daily.

We sure would appreciate any information you might be able to give us as to why these valve seats keep jumping out.—*J.M., St. Louis, Mo.*

Answer: If valve seat inserts become loose, it is because (1) the fit in the recess was not tight enough; (2) the fit was too tight if the cylinder block cracks at the valve seat recess; (3) there is distortion or expansion due to an unusual heating condition, or (4) too much tappet clearance allows the valves to hit the seats at closing ramp speed instead of quieting ramp speed.

Therefore, we would make certain that tappet clearances are in accordance with factory specifications; that the interference between seat recess and seat insert is exactly right and that there are no deposits in the water jacket which could cause hot spots at the valves. In addition, we would be sure to use valve rotators to expedite the cooling of the valves. Perhaps bevelling the top of the insert about 1/16" and then peening around it might help to hold the seats in place under unusual stresses.

It occurs to us that possibly the 15 to 20 stops made per day allow the engine to cool partially, and then when the engine is accelerated rapidly (possibly up steep and long grades) it gets quite hot too rapidly.

Stumped by Generator

A 1951 Pontiac was recently brought into my shop after three other shops in town were unable to locate why the car's generator was misbehaving. I have considered myself an "ignition specialist" for the past twenty years—but I must admit, this one has me stumped.

Here is the problem: When you start the engine, the ammeter hand goes over on the charge side, as it should, and as the battery builds up, the ammeter hand returns and shows a slight charge. When you speed up the engine and turn on the headlights, heater, and radio and then let the engine come back to idle the ammeter hand swings to the discharge side—just as it should . . . but here's the catch: Speed the engine back up and the cut out points open and close very rapidly and arc very badly.

I found that when this happens the

(Continued on page 8)

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5164-GS-B
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It will pay you to investigate how easy it is to own and use *Snap-on* tools. The *Snap-on* man who calls at your shop can give you the simple details in a few minutes. Ask him about it.

Prices subject to change without notice.

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Automotive Clinic . . .

(Continued from page 6)

generator polarity has changed from negative to positive, and if you turn the ignition off, nine times out of ten the cut out will stick in the closed position. You can re-polarize the generator and it works fine, until you try the above procedure again.

I have tried a new generator armature, a new regulator, checked the regulator-to-ground, checked all wiring for shorts, grounds and open, and the battery is properly installed.

Can you please come across with some help for this "specialist."—*W.S., Seth, W. Va.*

Answer: From the description of the way the generator and cut out act, it appears the trouble is caused either by a defective ground of the regulator or a poor ground connection from the frame to the engine.

If you will take a voltmeter and check the voltage drop from frame to engine, with all lights, radio, etc., turned on, you will probably get an excessive voltage drop. Do the same with the regulator, with the engine running, checking from regulator base to the engine ground. Also check from the frame to battery ground terminal.

Some funny things can happen when the grounds mentioned are not good. If you put on a ground strap from frame to engine, use a regular battery ground strap so it will have a minimum of resistance, and be sure that the connections at each end are clean and tight.

Axle Ratio vs. Gas Mileage

I am a member of the Armed Forces, and am wondering if you could help me out on a problem.

I own a '49 Ford which had a V-8 with standard transmission and overdrive. This was replaced by a Ford Six without overdrive. I've tuned the engine and installed a carburetor kit, plus rebuilt fuel pump, but I still get only 10 to 12 m.p.g. The only conclusion I can come to is that there must be a greater gear ratio between the O.D. and standard transmission.

The Ford parts book said the O.D. had a 4.11/1 rear while the standard had a 3.88/1 rear. They didn't specify as to 6 or 8 rear only to use with or without overdrive.

I have a chance to pick up a rear with a 3.72/1, and I'd like to know if you think these differences would affect the gas mileage by, say 5 to 10 miles a gallon, and if so, what ratio rear would you suggest for best mileage without laboring the engine?—*R.J.S., Camp Roberts, Calif.*

Answer: You would probably get a much improved gas mileage with the 3.72/1 rear axle ratio, though the performance of the engine would be more sluggish than with the 4.11/1 axle. That is to say, you could not accelerate as fast from a standing start or when under way, but you should get acceptable performance.

With a 4.11/1 rear end, when overdrive is cut in, the engine goes about 1/3 slower, making the effective axle ratio around 3.08/1, including the overdrive gears. Therefore, allowing for the difference in power between the Six and the V-8, you should get about the same performance as you would get with the overdrive in use all the time.

No. 2 Cylinder Won't Fire

A 1952 Kaiser in our shop is giving us a bit of trouble—there is a miss in the number two cylinder. To date, we have checked compression and found it to be 110 lb. in all cylinders, and a recent valve job was rechecked and found to be okeh; but just to be safe, new springs were installed on the No. 2 intake and exhaust valves, and all clearances again rechecked.

The entire ignition system was checked out and found to be in perfect condition, and carburetor was replaced with a new one—still the cylinder was "missing." There are no leaks at the manifold, or anywhere else, for that matter. It just seems that the No. 2 cylinder gets no fuel.—*C.S.F., Punxsatawney, Pa.*

Answer: You do not tell us much about the behavior of the engine or at what speeds or under what conditions the cylinder misses. But from what you did say in your letter, it looks as if the trouble *is* in the ignition system.

Have you put the distributor on a distributor tester? Have you carefully watched the breaker arm as the engine is turned over slowly to see if the No. 2 lobe on the distributor cam opens the points as far as the others? Have you tried another distributor cap?

Have you carefully watched the rotor in the distributor as the starter turned the engine over to see if there is a spark jumping to a wire in the distributor? Have you tried running a new high tension wire to the No. 2 spark plug? Have you carefully examined the No. 2 tower in the distributor cap to see if it is clean and not corroded?

We know for a fact that if compression is good, if a cylinder gets the correct air-fuel mixture, and has a good spark at the right time, that it will fire. We think if you will follow the suggestions made here that you will lick the trouble.

WHEN CHANGING YOUR ADDRESS

Please notify us 5 weeks in advance. Supply us with both your old and new address, including address label from current issue if possible. Copies we mail to your old address will not be delivered by the Post Office unless you pay them extra postage. Mail address changes to Circulation Dept., Automotive Service Digest, 900 South Wabash Ave., Chicago 5, Ill.

Front Planetary Pinions

A question has come up in our shop regarding the "front planetary pinions" on Hydra-Matic transmissions. One view holds that the addition of a fourth pinion to the planet carrier changes the reduction of the front unit. The other view is that this change was made to distribute the load to the additional planet pinion because of the dual drive transmission.

Will you please advise which of the above is correct?—*L.R., Bronx, N. Y.*

Answer: In answer to your question, the number of "planet" pinions has nothing whatever to do with the gear ratios that may be obtained. The ratios depend entirely on the number of teeth and pitch diameter of the ring gear, the planet gears and the sun gear. As you assumed, the added pinion is for the purpose of distributing the load better.

No Brake Fluid

When one of my customer's 1938 1½ ton truck sets for two or three days the master cylinder loses all of its brake fluid. If the truck is used every day the fluid stays in the master cylinder and the brakes are good, but let it set for a couple of days, and no brakes. As soon as you start up the engine, excessive smoke comes out of the exhaust.

I have honed the master cylinder and installed a repair kit in the vacuum booster and checked all wheel cylinders and lines for leaks, but the trouble is still with me.—*D.L.S., Emmett, Idaho.*

Answer: About the only way that the master cylinder can lose its fluid would be in the case of a defective seal around the push rod into the slave cylinder, which would allow the fluid to get into the vacuum chamber. This would seem to be confirmed by your statement that when the engine starts, smoke comes out of the exhaust pipe. This smoke could be caused by brake fluid in the vacuum chamber being drawn into the engine.

If you will check the seal mentioned, it is probable that the trouble will be located, and installing a new seal will correct it.

General Motors

launches a vital new program to make America's highways safer after dark

ON THE NEXT TWO PAGES you will see one of the most important messages ever published by General Motors. It concerns the safety of every man, woman and child who rides in cars at night.

The problem that confronts us all is a serious one. It centers in these three vital yet little-known facts which have been reported by national safety and research organizations:

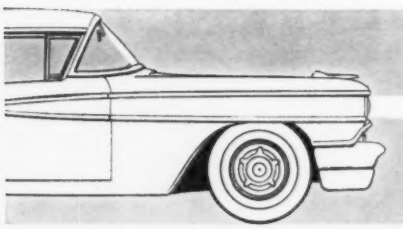
1. *Three times* as many fatalities occur after dark as during daylight hours, in proportion to mileage driven.
2. *Up to 80%* of the light needed for safe driving vision is lost when headlight aim is too high, low or offside.
3. *More than half* of all cars on the road today have headlights which are NOT aimed accurately and safely.

Something must and can be done to correct this situation. In the interest of public safety, General Motors has developed a program to publicize the need for headlight aiming and to make it easily available to all motorists through your cooperation.

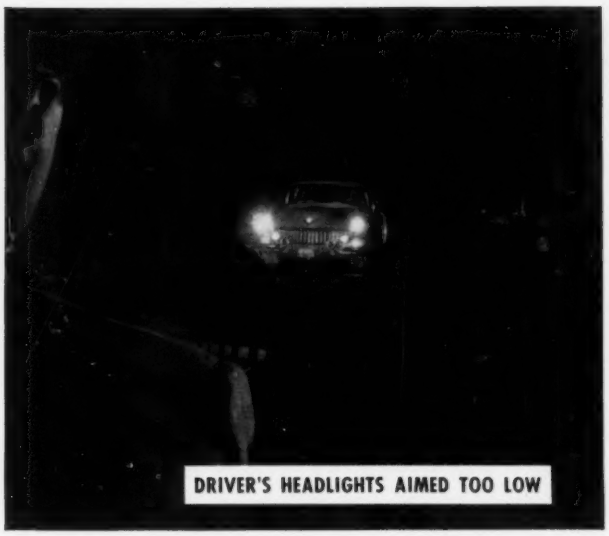
The success of the entire program . . . the saving of countless lives . . . depends upon conscientious and convenient headlight aiming service. I earnestly hope you will do your part.

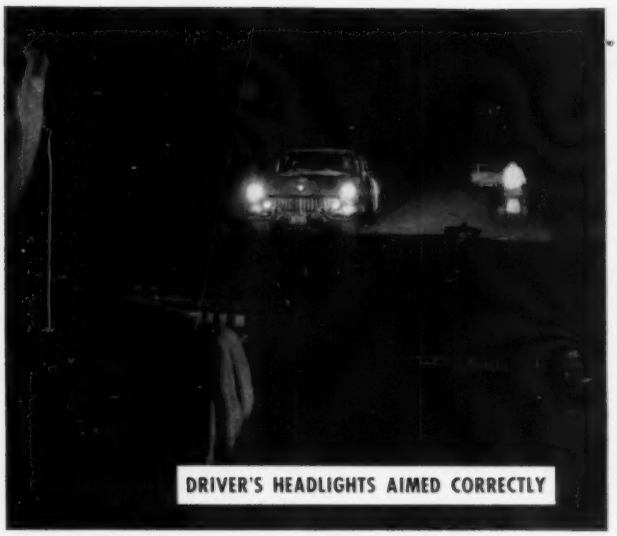
Harlow H. Curtice

PRESIDENT



AIM



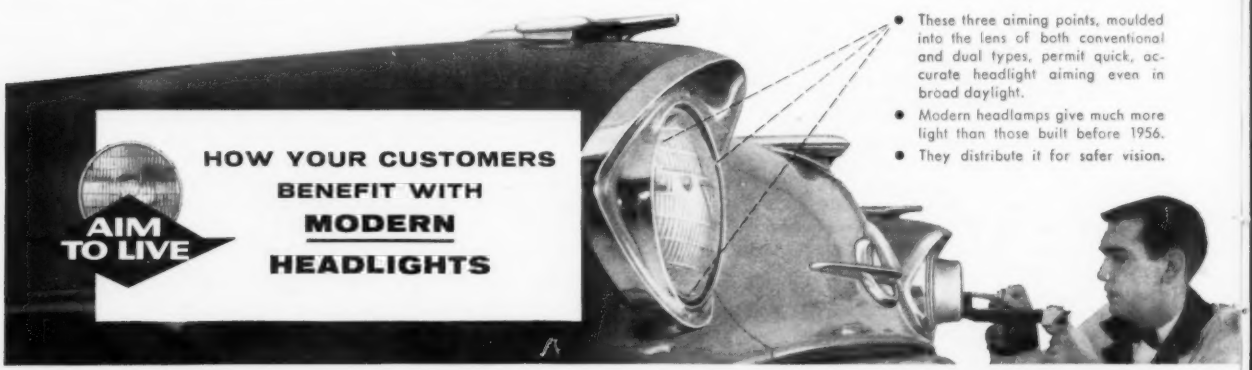


A public service HEADLIGHT AIMING RICH REWARDS FOR YOU!

The photos above show a major reason why highways are so much more dangerous after dark—over 50% of all drivers are losing up to 80% of the light needed for safe vision *because their headlights aren't aimed right.* We in the automotive industry can help save thousands of lives by (1) educating the public to the need for accurate aiming, and (2) making it easily available at reasonable cost.

GENERAL MOTORS AIMS TO DO ITS PART by sponsoring this educational AIM TO LIVE program. A nation-wide magazine, television and publicity campaign, now getting under way, is telling practically every American motorist how headlights get out of aim and why they should be re-aimed twice a year for safety. During March and April, a $100,000 AIM TO LIVE safety slogan contest will stimulate added interest. Participating dealers, garages and service stations will be given supplies of AIM TO LIVE display material and contest entry blanks at no cost.

ONLY YOU CAN FINISH THE JOB! All this educational effort will do little good unless we make it easy for drivers to get their headlights *aimed right,* and remind them when their cars are being serviced. *That's where you come in!* This is a great new opportunity to perform a vital service for your customers and increase both their goodwill and your income, by checking their headlight aim as regularly as their brakes.


AIM TO LIVE
HOW YOUR CUSTOMERS BENEFIT WITH MODERN HEADLIGHTS
• These three aiming points, moulded into the lens of both conventional and dual types, permit quick, accurate headlight aiming even in broad daylight.
• Modern headlamps give much more light than those built before 1956.
• They distribute it for safer vision.

TO LIVE

The Nation's Newest, Most Important Highway SAFETY CAMPAIGN

PROGRAM...with

IT'S EASY TO DO YOUR PART—(1) Get a new low-cost mechanical headlight aimer if you don't already have one. It's simple to use, takes up no extra space and quickly aims all modern platform-lens headlamps without even turning them on. (2) Train your men to use it *right*. Anyone can learn how in just a few minutes.

AIM TO LIVE MEANS BUSINESS! You'll find *more than half* your customers' headlights need aiming right now—and *all* headlamps should be rechecked twice a year. This alone adds up to a lot of potential for you, but that's not all. Many of your customers should replace their obsolete headlamps with modern platform lens type that can be quickly and accurately aimed and give 15% more light. That means a lot of replacement business too!

NOW IS THE TIME TO GET READY! More and more motorists will be asking you to check their headlights as this AIM TO LIVE program gathers momentum. So make sure you have an adequate supply of modern replacement headlamps, accurate aiming equipment, and men who can use it *right*. If you have not already been contacted directly, call your authorized General Motors dealer or AC Guide Lamp Supplier for full details.

will reach over 100 million Americans via national magazines, Sunday newspaper supplements, television, publicity and displays!

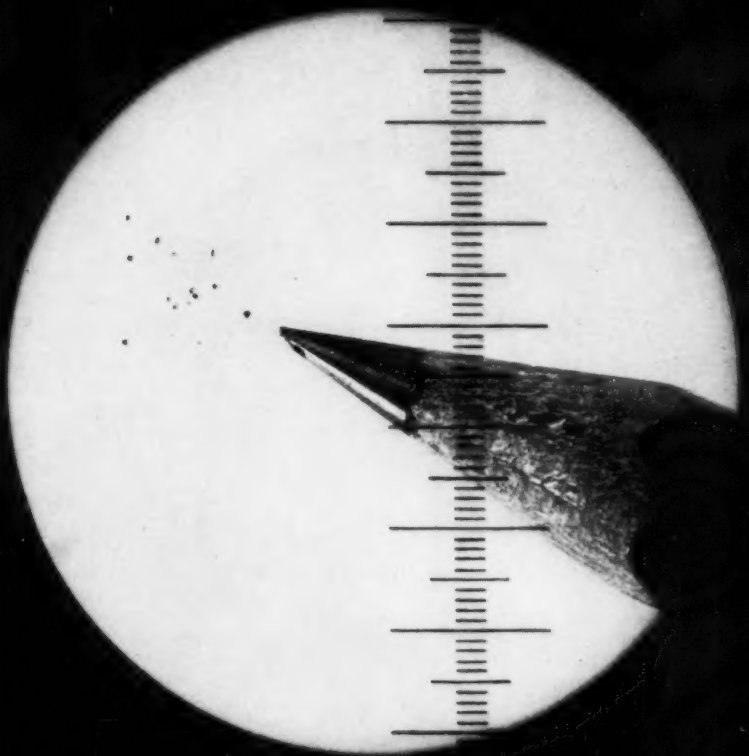
1908–1958
GM
FORWARD FROM FIFTY

CHECK HEADLIGHTS REGULARLY
AIM THEM ACCURATELY FOR SAFETY

General Motors

CHEVROLET • PONTIAC • OLDSMOBILE • BUICK • CADILLAC • GMC TRUCK • GUIDE • AC

specks the size of a micron



can shorten engine life

...a big fact to help you sell MoPar Micronic Oil Filters!

Waste and abrasive particles far *too small to see* with the naked eye can have a deadly effect on engine performance. That's the problem that led to the development of the MoPar Micronic Oil Filter. It actually eliminates these particles from the oil system, to the incredible size of a micron (.000039 of an inch).

- This means that the MoPar filter catches over ⅓ more dirt per square inch than ordinary filters.
- It gives greatly increased filtering *speed* because the filter surface is over 8 times that of conventional types—571 inches against 69.
- And MoPar offers far greater capacity; 3 to 5 times the capacity of a waste-type filter of corresponding size. And there's no unloading, warping or distorting.

Satisfy your customers with top engine performance and longer engine life. This is a filter you can *sell!* MoPar means *official, authentic* Chrysler Corporation parts and accessories, made to highest precision standards. For quick service, call your MoPar wholesaler salesman or your Plymouth, Dodge, De Soto, Chrysler or Imperial dealer.

MoPar
PARTS & ACCESSORIES

MoPar Division, Chrysler Motors Corporation, Detroit 31, Michigan

Editor's page

We must look to our schools for help!

• LOOKING BACK INTO the history of the automobile business you find that there always has been a shortage of really skilled mechanics to take care of all the motor vehicles in operation in any one year.

The pitch today is that the ratio of capable mechanics to cars is getting constantly bigger. It can become a serious threat unless all factions of the industry join hands in a concerted effort to get more young men into the technical service field, stay in it and carve out for themselves careers as automotive technicians.

The long haired men who delve into statistics tell us that 60 cars to a mechanic is a good ratio. But, back as far as 30 years, the ratio was bigger —about 68 cars to a man. More figures tell us that at present, with over sixty-seven million motor vehicles, there's a ratio of 87 cars to one mechanic.

The ratio might climb even higher. Those who like to project figures say we may have over ninety million vehicles on the road along about 1967 or so. That could easily boost even higher the vehicle-to-mechanic ratio.

While it's necessary and probably a good thing to keep a watchful eye on the future of automotive service so far as the availability of technically trained manpower is concerned, it's the immediate shortage of trained mechanics for which a workable idea or answer would be most welcome by the trade. It is reassuring to know that the car manufacturers' group, trade associations, manufacturers and many others conduct training courses, which, with those of vocational schools, high schools and other institutions, are doing a creditable job towards cutting down the ratio of cars per mechanic.

What appears to be a good step towards easing the mechanic shortage in the future was the formation last year of the Future Automotive Technicians of America clubs in the nations high schools. Commenting on this at the recent convention of the Minnesota Trade and Industrial Ass'n., an affiliate of the Minnesota Vocational Ass'n. and American Vocational Ass'n., J. Ray Riley of National Bushing and Parts Co. speaking as a representative of NSPA said: "The automotive service industry welcomes and will watch with interest, the progress of this new organization of high school students in the automotive instruction classes. We feel that by bringing the students together to talk about their vocational interests, such a club has definite value."

The public and private vocational and high schools with their mass enrollment are looked upon to do their part in furnishing the national economy with technically trained automotive men so urgently needed now and even more so in the years to come. The high school boys of today studying automotive mechanics are the source of our service managers, foremen, technicians and mechanics of tomorrow.

Ben Ikert
EDITOR

By HERB CARRIER
Detroit Editor

Aim to Service . . . to Sell . . . to Live!

As a serviceman in the automotive aftermarket, you have a responsibility beyond that of *doing* a good mechanical job. What you *don't do in* addition to the actual repair work can result in a so-so reputation, the loss of business, and, possibly, someone's life.

● "THREE TIMES AS MANY fatalities occur on our roads after dark as during the daylight hours in proportion to mileage driven.

"Last year's night driving toll in the United States amounted to more than 20,000 lives," said Harlow H. Curtice, President of General Motors, during his recent announcement of the nationwide "Aim To Live" campaign for better vision on the highways to help reduce the excessive night driving toll.

"In addition," he said, "we have found that more than 50 per cent of the cars on our highways today have headlights that are *not* properly aimed. In extreme cases, the drivers of these cars are losing up to 80 per cent of the light available to them."

These facts that Mr. Curtice brought to light can't help but lead to the conclusion that improperly aimed headlights may be one of the big reasons why the night fatality rate on our highways is so much greater than the day rate.

The tragic part of this high nighttime death rate is, of course, the human life lost. And, on the other hand, it's disturbing to hear that half of all the cars on the roads today—literally millions of units—have not been getting the service they require.

Over one half the number of cars on the road have incorrectly aimed headlights and drivers of these cars are losing up to 80% of available light—reason enough for a better vision campaign by service personnel.

WHO'S TO BLAME?

In a case like this, it's not always easy to point a finger at the guilty party. Certainly, we in the service business must share some of the responsibility. Few, if any, car owners can tell exactly when their car's headlights are not correctly aimed.

The change from correctly aimed headlamps to out-of-adjustment headlights is usually a gradual thing—not a suddenly dramatic revelation. Consequently, the driver of every second car on the road may not be aware that he is endangering his life, as well as the lives of others, by creating bad nighttime driving conditions.

But, while this may be a fairly sound excuse for the car owner, it won't let us off the hook. We're the experts. We are *supposed* to know these things. That's part of the reason why we're in business. If we know a particular car has incorrectly aimed headlamps, yet fail to "sell" the owner on the importance of letting us make an accurate adjustment, then we aren't doing a complete service job.

REASONS FOR MISALIGNMENT

There are several reasons why headlight alignment should be checked regularly: "Settling" of the car due to normal wear on springs, shocks, etc., bumps and jolts from rough road surfaces, and—as any attendant can tell you—some parking lot socks pack enough wallop to jar loose the mountings of a Sherman Tank!!

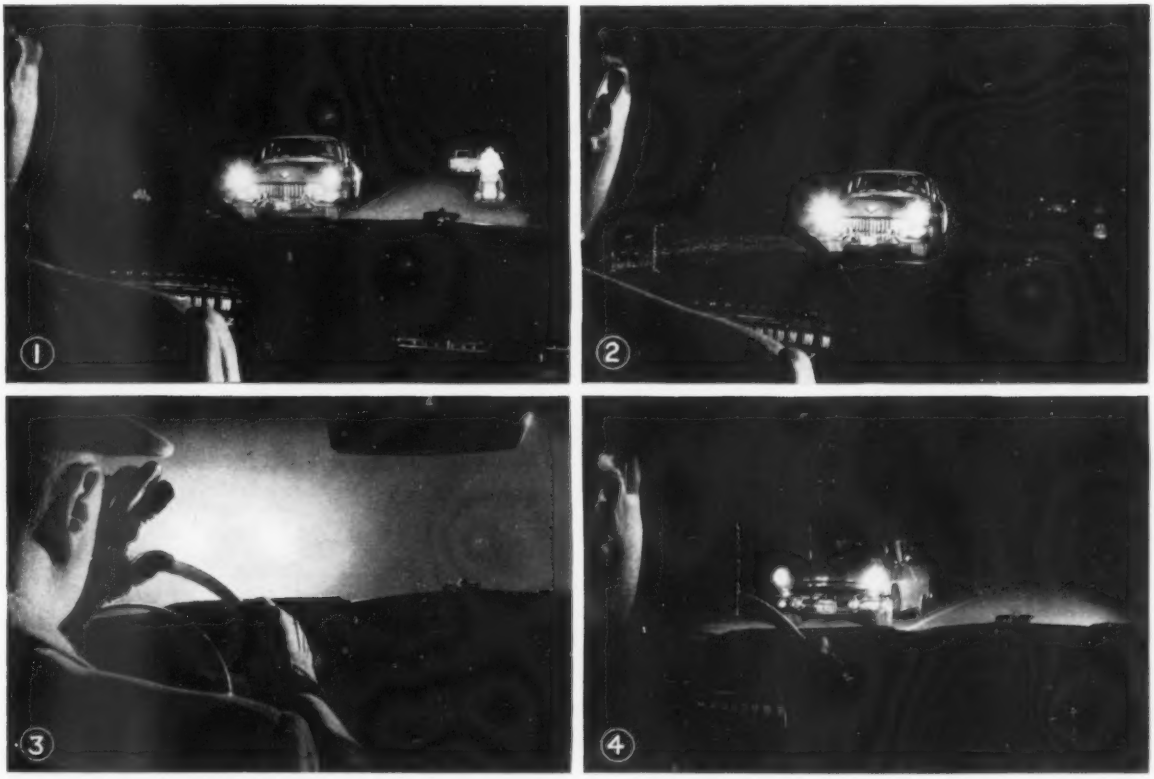
Any one of these is enough to warrant periodic aiming checks. A combination of all three makes it all the more imperative.

"AIM TO LIVE"

Last month Mr. Curtice announced as one of the objectives of GM's "Aim To Live" campaign; "Urging every motorist to have his headlights aimed immediately and then have them regularly inspected twice a year."

This means that the service mechanic will be taking a very active part in this worthwhile program.

An "active" part means not only *doing* a good job of aligning headlights, but it also means that we must be sure all of our customers are well "served" in other safety areas. Finding out that over 50% of all cars on the road have improperly adjusted headlamps makes us



This sequence of illustrations shows the effects of good and bad headlight aiming. In No. 1 driver's headlights are correctly aimed for an approaching condition. Note how clearly the motor scooter and highway shoulder appear, and how well the rear of the forward vehicle can be seen. In No. 2 the scooter and the rear of the forward car are dangerously less visible because the driver's headlights are aimed too low. Also, the shoulder of the road is hard to see. In No. 3 approaching the headlights are either badly out of adjustment, or the driver failed to dim them. In this case, complete visibility is drastically reduced. In No. 4 both drivers have their headlights safety dimmed. Note the lack of glare and the excellent visibility.

realize that we haven't been doing a good job of detecting and selling vital safety service work.

CHECK EVERY CAR

As a matter of business policy—as well as self-defense—we should check the headlight alignment of every car we service *without* waiting for the customer to ask us to do it. By using modern headlight aiming devices, an accurate check can be made in just a few minutes.

If the check indicates headlights are out of alignment, they can be quickly aimed by using the same device as for checking.

If your shop is still using the screen and pattern method of checking headlights, it will probably prove profitable for you to invest in modern aiming equipment. Some of the newer devices are moderate in cost. They can be used anywhere in the shop, and require no floor space other than enough room to walk around the vehicle. Using such equipment, the adjustment of modern headlights—which provide three precision aiming points molded into the rim of the lens—can be made in bright sunlight without turning the headlights "on."

LOOK FOR CAUSE

Before aligning incorrectly aimed headlights look for any unusual cause of mis-adjustment. Is the front end sagged too far due to weak springs, or shocks? If so, explain to the owner that you can bring the lights within specifications, but bad springs, shock absorbers, or any other faulty part should be replaced for safe, comfortable operation of his car.

Look, too, for badly rusted or defective headlamp assemblies. These must be corrected before a satisfactory adjustment can be performed.

DIMMER SWITCH OFTEN GUILTY PARTY

Faulty dimmer switches are reasons why some drivers fail to dim their highway lights when they should. Check the operation of every dimmer switch each time you check or adjust headlight aiming.

Of course, the headlight check should just be part of a regular safety inspection. Check the operation of all lights including tail lights, stop lights and parking lights. Also test the operation of the turn indicators.

Check high beam indicator on the instrument panel. If the indicator is not working properly, it's possible the driver will not dim his lights when he's supposed to because he may not be sure which beam is in operation.

CARS WITH AUTOMATIC DIMMERS

Be sure to carefully check out cars equipped with automatic dimming devices. Most such units have sensitivity adjustments to provide a means of keeping the automatic change from high to low, and back again, within specified light conditions. This is very important. Satisfactory operation of this accessory is actually a safety feature. Faulty operation on either the high or low end

(Continued on following page)

"Aim to Serve" . . . CONTINUED

can cause serious visibility problems.

Also, make sure the instrument panel photo tube is properly mounted and correctly aimed. A unit slightly off recommended position can't operate correctly.

BRAKES, CLUTCH, ETC.

No safety inspection is complete without a check of the brakes, clutch (if used), tires, and any other item which influences safe operation of the vehicle. By developing a habit of automatically inspecting each car you service, you can make most checks during your regular working routine.

LOW PRESSURE SELLING

When calling the customer's attention to a faulty safety condition which should be corrected, it's usually best to use the "low pressure" technique. Trying to scare, force, or brow-beat the owner into getting all the work done "right here" and "right now" may get you an occasional extra service job, but it's more apt to drive a potential customer away.

Most owners want to keep their cars in safe operating condition, and they count on competent service men to keep them informed on what corrections are necessary. But they want to make up their own minds about when to have the work done. At least, they like to feel that they are buying service by choice—not being forced into it against their will by a mechanic with a hot ratchet and a hungry look.

SECRET OF SUCCESS

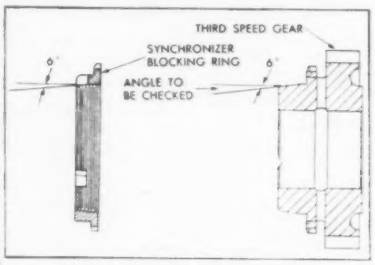
That's the secret of increased business in this safety area: A sincere interest in your customer's welfare, an honest periodic inspection of his car—preferably during regular lubrication or gasoline stops—and a "low pressure" sell of recommended repairs.

You owe it to yourself to follow, at least in general, some such pattern to keep your present service customers alive and happy, and to build up a following of new customers. No shop became successful by just doing a good job when asked. The reputation for alertness, honesty, and personal interest is, perhaps, as valuable as mechanical ability.

Start today to increase your prestige and profit by following the slogan "Aim to Serve—Aim to Sell—Aim to Live!"

Correcting Harsh Shift Into Third Speed On Corvette Four-Speed Transmission

According to a recent Chevrolet Service Bulletin, some 1957 and '58 Corvette four-speed transmissions have been built incorporating a third speed gear with 7° cone angle rather than the specified 6°, as shown in the accompanying illustration. This may cause a harsh shift into third speed due to the resultant improper engagement of the synchronizer blocking ring and third speed gear cone.



Checking Third Speed Gear

If such a harsh shift is encountered, Chevrolet suggests replacing the third speed gear assembly (No. 3743452) and the synchronizer blocking ring (3709348).

The following outlines an angle checking procedure for field usage.

1. Coat I.D. of blocking ring lightly with a dye such as Prussian Blue.
2. Carefully install the blocking ring on the third gear cone to obtain an engagement impression.
3. If the Prussian Blue impression on the cone is all at the rear (or predominantly at the rear) the cone angle can be assumed to be 7° and should not be used. If the Prussian Blue is more or less evenly distributed on the cone surface, the angle is correct.

Suppliers of Body Refinishing Materials Form "Automotive Refinish Institute"

"Automotive Refinish Institute" is the name officially adopted by a new organization dedicated to upgrading automotive painters and body shop operations, advancing refinish standards, and promoting better salesmanship in retail painting and refinishing outlets.

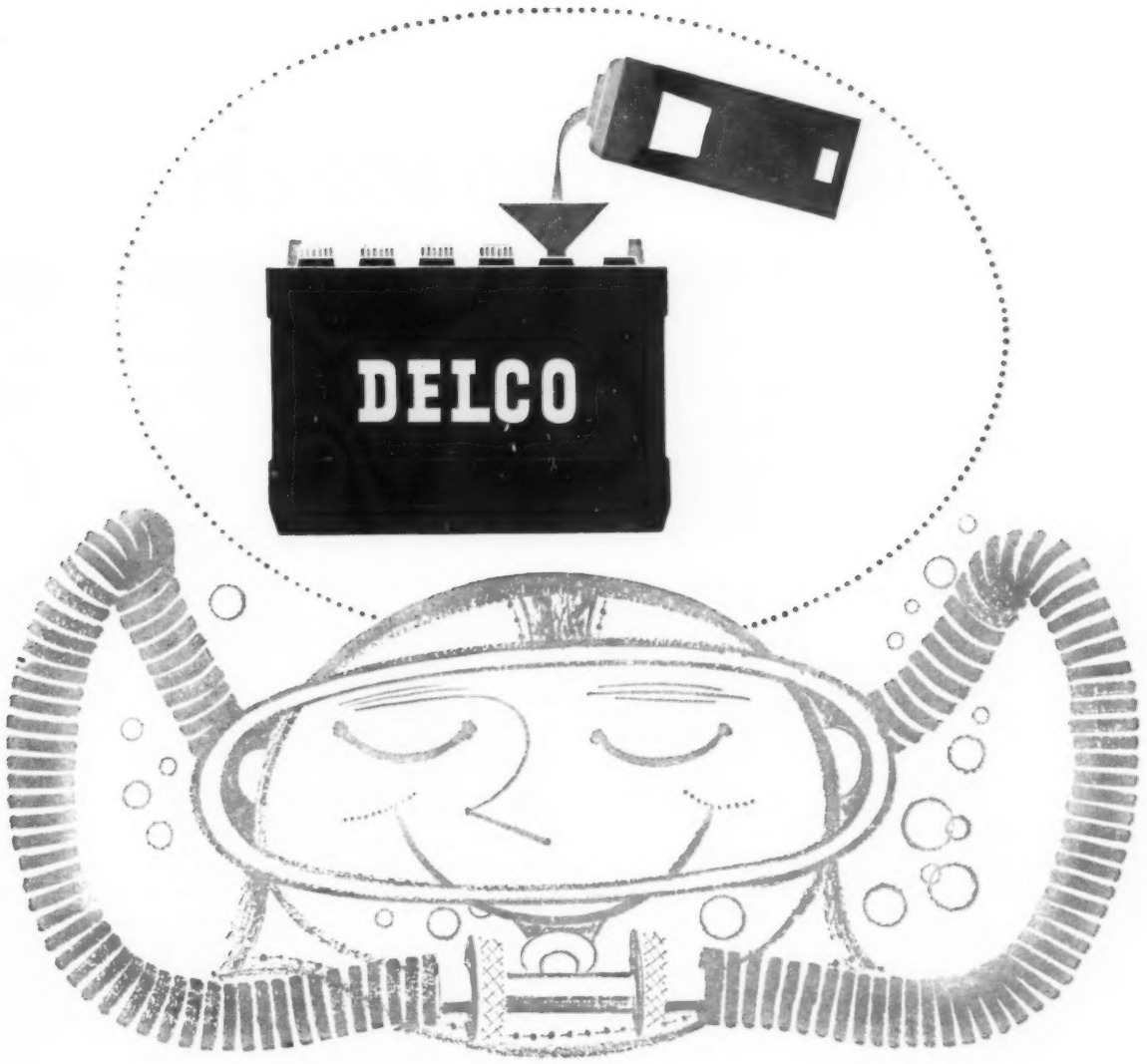
The name was selected at a recent meeting of the organization's charter members, composed of representatives of suppliers of spray painting equipment, automotive body tools and equipment, pressure-sensitive tapes, abrasives, paints and thinners, and allied products.

"The primary objective for 1958 will be the establishment of industry standards and procedures which will be used as a basis for the guidance of quality and efficient refinish shop operations," according to L. J. O'Doherty, of Acme Quality Paints, Inc., who was named chairman of the six-man executive committee composed of one representative of each of the five major segments of the industry, plus one member-at-large.

The committee includes: W. E. Marsden, Minnesota Mining and Mfg. Co. (vice chairman); A. S. Boehm, Black and Decker Mfg. Co. (treasurer); J. H. Gustafson, 3M Co. (secretary); L. M. Olson, Park Chemical Co.; G. I. Stoddard, DeVilbiss Co.; and J. R. Mason, Rinshed Mason Co., member-at-large.

Firms participating in the Institute, in addition to those mentioned, are: H. K. Porter Co., Sherwin-Williams Co., Martin-Senour Co., Binks Mfg. Co., Behr-Manning Co., Arco Paint Co., Bear Mfg. Co., and Blackhawk Mfg. Co.

"You must have run over that fork in the road you were looking for!"



SKIN DIVERS

want Delco Batteries!

So do clam divers, pearl divers, and car drivers. Fact is, three separate surveys made by leading magazines show Delco to be America's No. 1 battery preference. More people want Delco because it's the freshest power money can buy. *And* it's backed by a General Motors warranty good in the United States and Canada. Stock Delco Batteries and see how they sell themselves to every kind of customer.

Quality-built by Delco-Remy distributed nationally through

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General Motors leads the way—Starting with Delco Batteries

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Automatic transmissions

A complete series of articles covering automatic transmissions — their design . . . how they operate, and how they are serviced. Be sure to read and keep all future articles for ready reference.

Part V—Servicing the Powerglide

BY HERB CARRIER
Detroit Editor

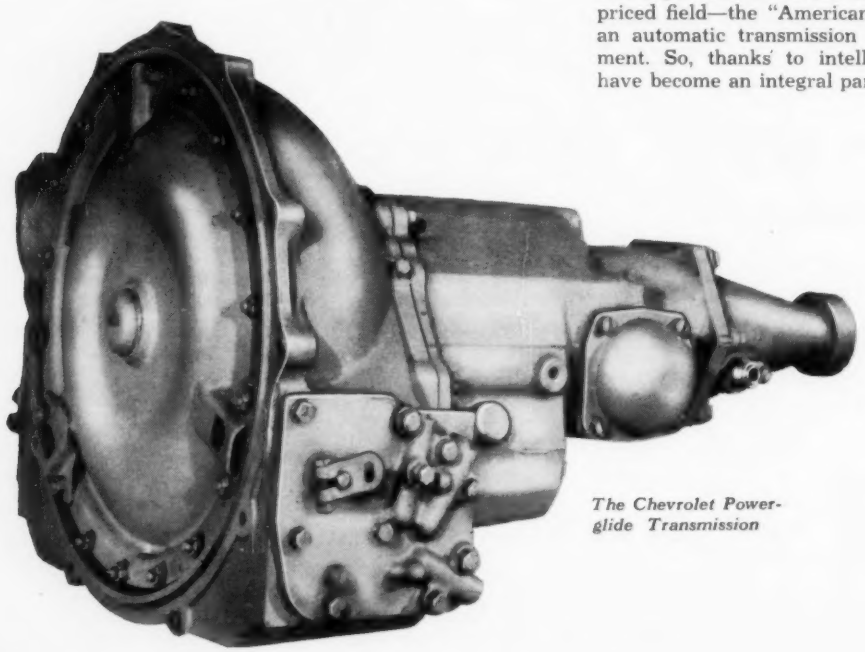
• NOT TOO MANY YEARS ago, an automatic transmission was thought of as a luxury reserved for the high priced cars. "I can do a lot of shifting for $200," was the characteristic comment heard from the prospective buyers of the low priced three.

Hearing this typical comment, the brilliant automotive market analysts frowned on the idea of equipping the smaller cars with automatics. When asked, they would shake their heads wisely and say, "It'll never sell. People buy low priced cars for economy reasons. They just won't kick in the comparatively high cost for the option of automatic shifting."

CHEVROLET TOOK LEAD

However, not all market analysts and manufacturers shared this rather pessimistic view. In the model year 1950, Chevrolet decided to let the people be the judge of what they wanted, and made available their Powerglide transmission. It was offered as an option, of course, but, even today, virtually all automatic transmissions are optional equipment, except for the so-called luxury lines.

Chevrolet's invasion into the field of automatic transmissions proved to be an intelligent step. Recent history reveals that Powerglide has become extremely popular, as, incidentally, has the automatic transmissions for Ford and Plymouth. Even the latest entry into the low, low priced field—the "American," by American Motors—has an automatic transmission available as optional equipment. So, thanks to intelligent pioneering, automatics have become an integral part of regular production auto-



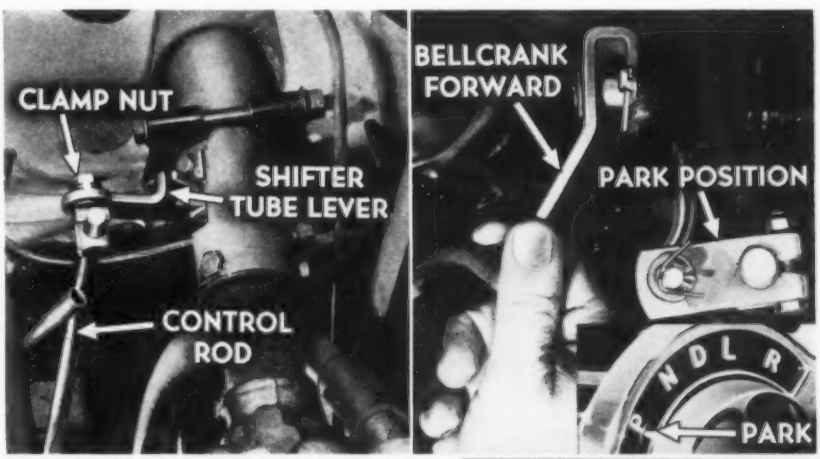
The Chevrolet Powerglide Transmission

mobiles from the least expensive all the way through the "Wow, That much?" class.

POWERGLIDE CONSTRUCTION

Powerglide uses a torque converter. This, as earlier discussions noted, is composed of a turbine, a pump, and a stator. The stator is placed between the pump and the turbine to change direction of oil as it's discharged from the turbine. The change of direction causes oil to flow in the same direction as pump rotation to give the pump an extra boost.

Therefore, by use of a stator, less engine power is required to drive the pump, and torque multiplication as high as 2.1 to 1, at stall, can be obtained to drive the rear wheels.



Positive linkage adjustment is made by loosening the clamp nut enough to permit control rod to move in its swivel without binding. Then, push control rod bellcrank forward as far as it will go to place the transmission in Park. Rock driveshaft to make sure transmission is in Park position. Next, place the selector lever in "P" (park), and securely tighten clamp nut.

SPEED CHANGES DIRECTION

As turbine speed increases, it gradually changes the direction in which it discharges oil so that at cruising speed turbine discharge oil exerts pressure on the *back* side of the stator vanes. Under this condition, a fixed-position stator would cause violent turbulance resulting in increased friction and power loss.

ONE-WAY CLUTCH

To compensate, the stator is not permanently fixed, but is mounted on a one-way clutch. At stall, and at speeds below the coupling point, the stator remains stationary to give the inherent advantages of a torque converter. At cruising speed, change of direction of the turbine discharge causes the stator to free-wheel on its one-way clutch, and be carried along in the rotating oil mass. The unit then functions as an efficient fluid coupling.

PLANETARY UNIT AND CLUTCH ASSEMBLY

The Powerglide planetary gear set and clutch assembly is a compact, single unit which furnishes LOW, DRIVE, REVERSE and NEUTRAL.

The planetary unit consists of a *reverse sun gear, low sun gear, short and long pinions,* a *reverse ring gear and drum,* and a *planet carrier.* A *reverse band* operates on the outer surface of the reverse drum.

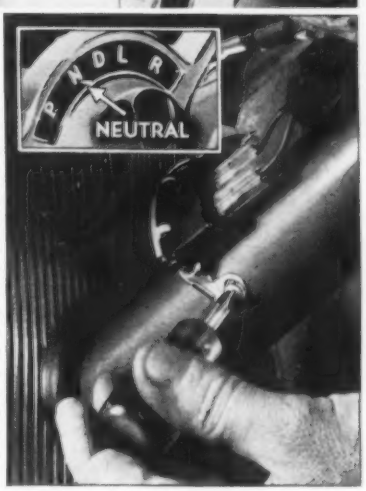
The clutch assembly, built up into a clutch drum, includes a *clutch piston,* a *clutch spring and piston seals,* and *nine clutch plates.* A *low band* operates on the outer surface of the clutch drum.

Five of the nine clutch plates are plain steel, while the remaining four are steel with a composition coating on either side. These plates are alternately arranged so that a coated plate is always in between two plain steel plates.

The plain steel plates are *externally* splined to the clutch flange. The four coated plates are *internally* splined to the clutch hub which is in turn splined to the input shaft.

CLUTCH OPERATION

When oil pressure is applied to the clutch piston, the plates are pressed together. This connects the clutch drum to the clutch hub, and hence to the input shaft. With the clutch applied, the low sun gear rotates with the input shaft. When oil pressure is relieved, the clutch is released by action of the clutch spring.



A neutral safety switch is mounted on the steering mast jacket. Its purpose is to prevent starter motor operation except when selector lever is in "N" (neutral) or "P" (park) positions. The switch can be adjusted by loosening its mounting screws and slightly rotating switch until correct operation is obtained. Be sure to securely tighten mounting screws without disturbing adjustment. Always double check switch operation in all quadrant positions.

POWERGLIDE OPERATION

When the selector lever is placed in "D"—normal driving range—the transmission starts in low gear. The clutch is released and the low band is applied. As vehicle speed increases, the transmission will automatically upshift to high range anywhere between 12 and 20 m.p.h., depending upon throttle pressure.

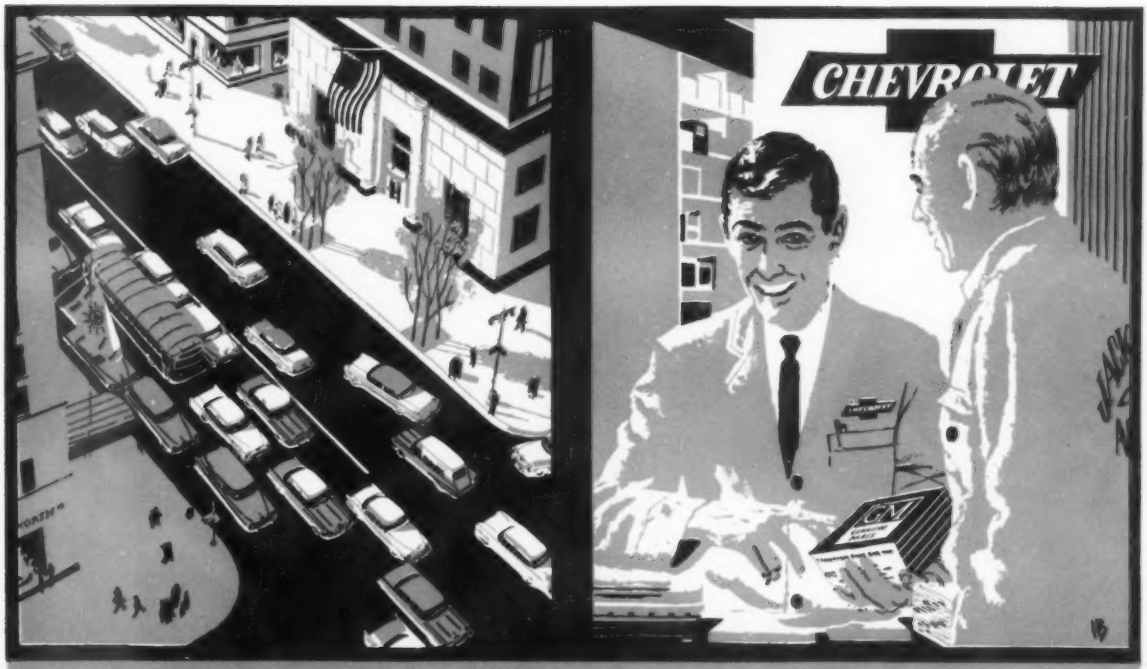
In high range the low band is released and the clutch is applied. The entire planetary system then revolves as a unit.

(Continued on page 22)

In the automotive service market...

THERE'S NO BUSINESS LIKE CHEVROLET BUSINESS

MAKE YOUR CHEVROLET DEALER YOUR PARTNER IN SERVICE
...HE IS READY, WILLING AND ABLE TO SERVE YOU!



BECAUSE...

There are more Chevrolets on the road than any other make—one out of every four.

AND...

Your Chevrolet dealer can be your one-stop source for genuine Chevrolet parts.

Yes, one out of every four cars and trucks on the road represents a big service market.

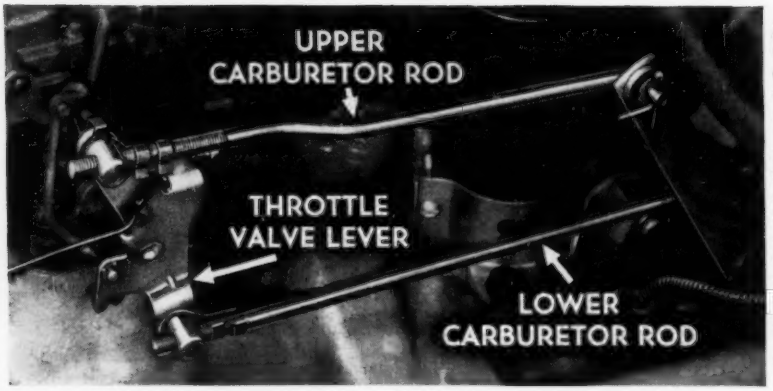
Your Chevrolet dealer is ready, willing and able to help you serve that market. You can make him a convenient, one-stop source for genuine Chevrolet parts.

Genuine Chevrolet parts are built of the same high-quality materials and to the same rigid engineering standards as the original parts. They are made to work together—made for a Chevrolet.

Your Chevrolet dealer has available service aids that can help you give better and more profitable service to Chevrolet owners.

CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

GM
CHEVROLET
GENUINE PARTS



For eight cylinder throttle valve linkage adjustment, disconnect both the upper and the lower carburetor rod swivels from the carburetor throttle valve lever. Then, pull the lower rod forward as far as it will go (through detent), hold carburetor "wide open", and adjust swivel for free entry of swivel pin into lever hole. Secure swivel. Next, pull upper rod as far forward as it will go to fully depress accelerator pedal, hold carburetor "wide open", make swivel adjustment and secure swivel.

Transmissions . . . CONTINUED

When the selector lever is placed in "L" (low), the clutch is released and the low band is applied to give the same mechanical result as when starting in "D" (drive). However, hydraulic action in "L" (low) prevents automatic upshift into high range. Consequently, the transmission will remain in low gear until the selector lever is placed in a different position.

In "R" (reverse), the clutch and low band are released, and the reverse band is applied to the reverse drum. This results in reverse rotation of the transmission output shaft at the reduction ratio of 1.82 to 1.

In the "N" (neutral) position, the clutch, the low band, and the reverse band are all released. With no holding unit applied, the gears are all free to spin around their own axis and no motion—in either direction—is imparted to the planet carrier.

SHIFT SEQUENCE

From the above information, it can be seen that Powerglide has a simple, uncomplicated method of obtaining the various gear ratios and directions of rotation. In a nutshell, the shift sequence is as follows:

1. NEUTRAL—No Bands
   No Clutch
2. LOW—
   Low Band Applied
   Clutch Released
   Reverse Band Released
3. HIGH—Clutch Applied
   Both Bands Released
4. REVERSE—
   Reverse Band Applied
   Clutch Released
   Low Band Released

SERVICE ADJUSTMENTS

Powerglide requires three basic service adjustments: (1) Positive Linkage Adjustment, (2) Neutral Safety Switch Adjustment, and (3) Throttle Valve Linkage Adjustment.

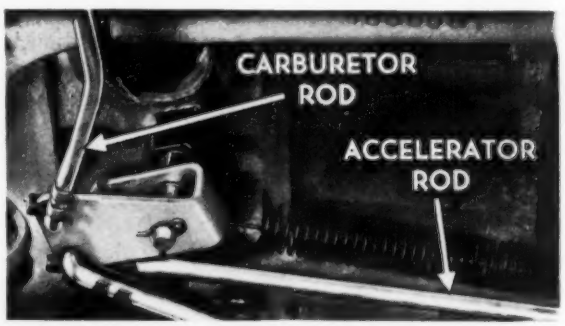
Positive Linkage is more often called Selector Lever Linkage. Its adjustment must be correct to insure that selector lever position corresponds to manual valve position. For example, if the selector lever indicator points to "D" (drive), the manual valve must also be in the "D" (drive) position, and so on throughout the rest of the quadrant.

The neutral safety switch must be properly positioned so that the starter motor cannot be operated except when the transmission is in "N" (neutral), or "P" (park) positions.

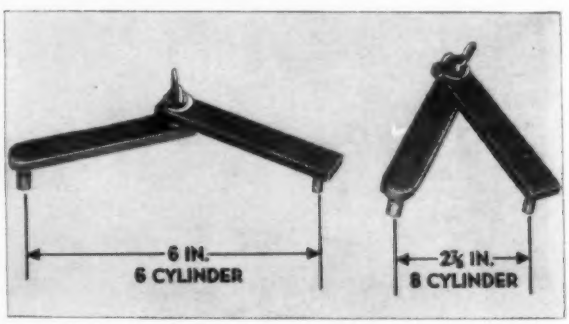
The throttle valve linkage adjustment is provided to maintain the correct relationship between the accelerator pedal, carburetor throttle plate opening, and the throttle valve inside the transmission. This relationship must be accurately adjusted to provide satisfactory transmission operation, particularly on light throttle upshifts.

POSITIVE LINKAGE ADJUSTMENT

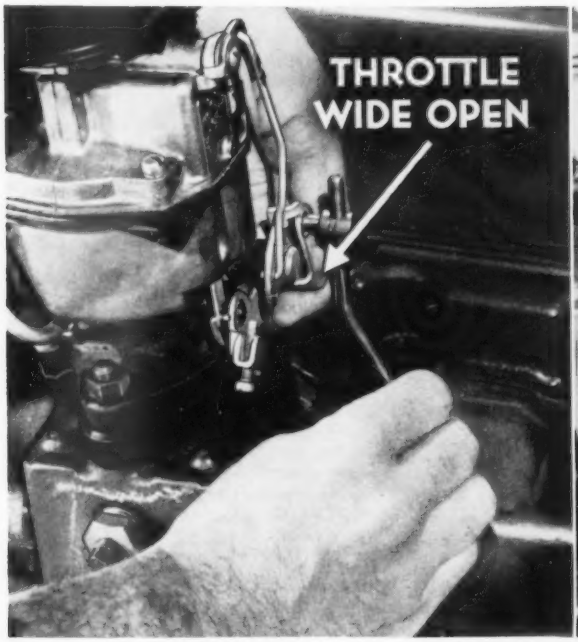
Loosen the clamp nut on the shifter tube lever enough so the upper control rod can move freely in the swivel. Then, from underneath the vehicle, push the control rod bellcrank as far *forward* as it will go. (Internally, this places the transmission in "P" (park) position.



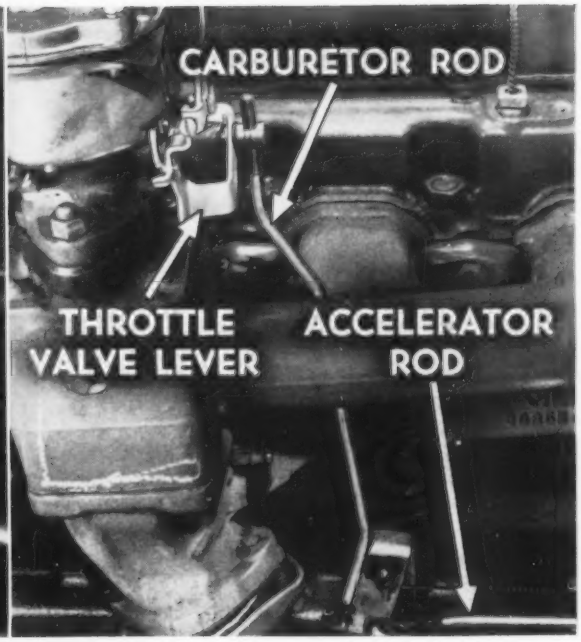
To adjust six cylinder accelerator rod, fully depress accelerator pedal, hold carburetor "wide open", and adjust swivel for free entry into hole in bellcrank, If care is taken, the accelerator pedal can be depressed by pulling the accelerator rod as far forward as it will go. Be sure that neither the pedal nor the rod bind with floor mat or fire cowl.



Transmission throttle valve lever is properly positioned by use of a special adjusting tool. The tool can be set to accommodate either six or eight cylinder application. When setting tool, be sure to measure from the center lines of the locating pins, not the inner surface. (Note: These dimensions are for 1955 Powerglide only. Check manufacturer's specifications for other model years.)



When adjusting six cylinder carburetor rod, hold the carburetor lever in the "wide open" position. Pull carburetor rod up as far as it will go (through detent). In this position, adjust swivel for free entry into hole in carburetor lever and secure the swivel.



On six cylinder models, disconnect the carburetor rod swivel from the throttle valve lever on the carburetor. Also, disconnect the accelerator rod swivel from the bellcrank mounted on the engine block.

From inside the vehicle, position the selector lever so the quadrant pointer is directly at "P" (park).

With both transmission and selector lever in PARK, tighten the clamp nut to secure the adjustment. This simple sequence insures that placement of the manual valve will correspond exactly with selector lever position in any, and all, quadrant stations.

NEUTRAL SAFETY SWITCH ADJUSTMENT

Loosen both screws which attach the switch to the steering mast jacket. Do not remove the screws. Place the selector lever in "N" (neutral) position, and slowly rotate the switch to a point where the starter motor will operate when the starter switch is closed. Securely tighten the mounting screws without disturbing adjustment.

This adjustment is important enough to warrant a careful double check. It can be embarrassing and dangerous if the engine starts in any position other than "N" (neutral), or "P" (park). Carefully try to start the engine in all selector lever positions. If starter motor operates in "D" (drive), "L" (low), or "R" (reverse), or if it fails to operate in "N" (neutral) or "P" (park), relocate the safety switch to obtain proper adjustment.

THROTTLE VALVE LINKAGE ADJUSTMENT

This is the only service adjustment which differs according to transmission application. Adjustment procedures for eight cylinder models do *not* apply to six cylinder models, and vice versa. The same adjusting tool is used for each model, but it, too, must be set to accommodate six or eight cylinder application.

Six Cylinder Adjustment: To provide a point of reference, remove the upper rear bolt and lockwasher from the rear edge of the low and drive valve body. Set adjusting tool so that the distance between the locating pins—measured from the center of the pins—is exactly six (6) inches.

Remove the throttle rod from the throttle lever. Rotate lever counterclockwise as far as it will go. Pressure will be felt as the detent spring is contacted. Do not stop at this point. Continue counterclockwise motion until lever reaches a solid stop.

In this position, the tool locating pins should freely enter the hole in the lever and the hole from which the bolt was removed.

If adjustment is necessary to obtain this condition, remove lever clamp bolt, and loosen lever adjusting bolt. Using a pin punch of suitable size, return lever to full counterclockwise position. Adjust lever to where the tool locating pins freely enter the reference holes.

Then, tighten the adjusting bolt, remove tool, and securely install clamp bolt. Reinstall rod to lever.

The lever is now correctly located. Next, the accelerator rod, and the carburetor rod (which controls the carburetor throttle plate) must be adjusted to establish the proper working relationship between all three units —carburetor, accelerator pedal, and transmission throttle valve lever.

To do this, disconnect the carburetor rod swivel from the lever on the carburetor. Also, disconnect the accelerator rod swivel from the bellcrank on the engine block. Hold carburetor lever in "wide open" position. Pull up on carburetor rod as far as it will go. Again, make sure the rod is through detent. In this position, adjust rod swivel until it freely enters hole in lever. Securely fix swivel in lever.

Complete six cylinder throttle valve linkage adjustment by fully depressing accelerator pedal, holding carburetor lever in "wide open" position, and adjusting rod swivel for free entry into hole in bellcrank. Secure swivel pin.

Eight Cylinder Adjustment: This adjustment is similar to the six cylinder procedure. The same principle is in-

(Continued on following page)

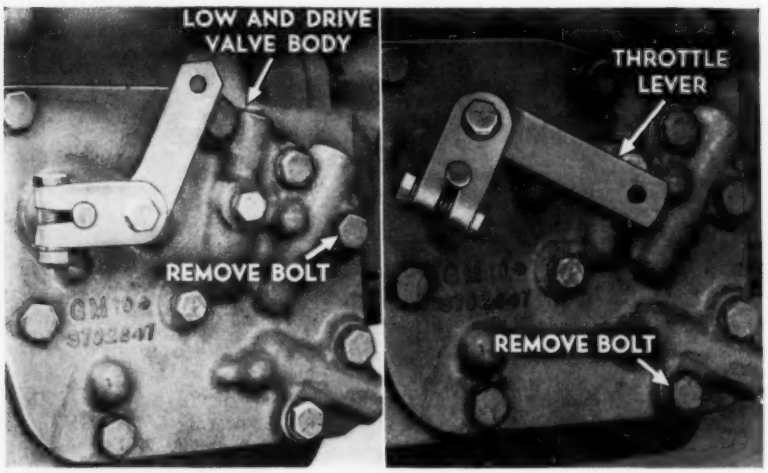
volved, that is, adjust throttle valve lever until the locating pins on the adjusting tool freely enter hole in lever and hole from which bolt was removed.

However, for eight cylinder models, the distance between the locating pins is set at two and seven-eighths (2⅞) inches, and the *lower* rear bolt is removed instead of the upper rear bolt.

For eight cylinder rod adjustment, remove both upper and lower carburetor rods from the carburetor lever. Pull the lower rod all the way forward (through detent).

external adjustment. Adjusting procedure is relatively simple, but is extremely critical. A poor band adjustment is often worse than leaving the band slightly out of adjustment. It's only a matter of careful workmanship, not complicated procedure.

The latest word from Chevrolet engineering outlines the following adjusting technique: Remove protective cap from adjusting screw. Loosen locknut, and back off adjusting screw about ½ turn. Using a torque wrench, tighten adjusting screw to 5 to 7 ft. lbs. Then, back off adjusting screw four (4) full turns. Securely tighten locknut without disturbing adjustment, and replace cap.



To establish a point of reference for six cylinder throttle lever adjustment, remove upper rear bolt and lockwasher from rear edge of low and drive valve body. For eight cylinder models, remove the lower rear bolt and lockwasher. (Note: This is pertinent to 1955 transmissions only.)

Hold carburetor lever in "wide open" position, and adjust rod swivel for free entry into the hole in the carburetor lever. Secure swivel.

To complete eight cylinder adjustment, fully depress accelerator pedal. Hold carburetor lever in "wide open" position, and adjust upper carburetor rod for free entry into its hole in the carburetor lever. Secure swivel.

Note: ***The above adjustment procedures are pertinent to the 1955 Powerglide. For years other than 1955, procedures are identical except for specific bolt removal, and special adjusting tool dimensions. Check manufacturer's specifications for particular model information.***

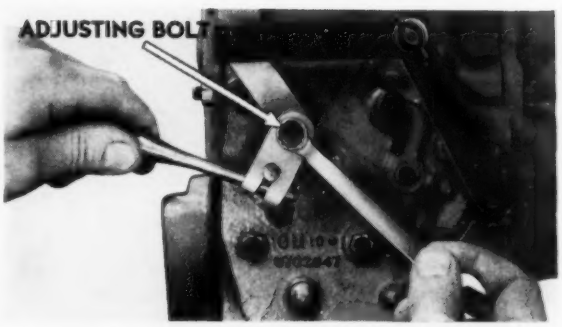
BAND (SERVO) ADJUSTMENT

Powerglide is famous for requiring very infrequent band adjustments. (Powerglide "band" adjustment is actually a servo adjustment.) The reverse band, for example, because of its limited application, need only be adjusted during overhaul. Rarely does the reverse band wear enough to require adjustment. For this reason, no facility is made for external reverse band adjustment.

It can be adjusted in-vehicle, however, by removing the servo cover. This operation is not recommended. The cover can easily be removed—except for 1958 models which require considerable effort due to frame design—but getting the cover back on properly is quite a job. And damage to the servo and regulator valve springs too often results.

If reverse band operation is faulty, it's best to tear the transmission down for inspection. It's more than likely mechanical difficulty that a band adjustment would not correct. Certainly, reverse band adjustment does not come under the heading of quick service.

The low band is subject to wear, and does have an



To adjust the throttle valve lever, remove lever clamp bolt, and use a suitable pin punch to rotate lever counterclockwise as far as it will go (through detent). Loosen adjusting bolt, and adjust lever until locating pins on adjusting tool freely enter hole in lever and hole from which bolt was removed. Tighten adjusting bolt, remove special tool and securely install clamp bolt.

In-vehicle Powerglide service can be profitable because of the minimum number of special tools required, and the easy-to-work-on design. This, plus the fact that historically Chevrolet turns out huge numbers of vehicles per year, makes a working knowledge of Powerglide service especially valuable.

Next Month—Servicing the Fordomatic.

A company-by-company survey of the automobile industry by Kaiser Aluminum shows a 13% greater use of aluminum in 1958 models over 1957, and a gain of 81% over 1955. The average amount of aluminum in the '58 models is 44.9 lbs., as compared with 39.6 lbs. in '57 and 24.8 lbs. in '55.

Infra-red radiant heating system a boon to service shop personnel

• DOING ANY KIND of mechanical shop work in a cold room is anything but pleasant. Frigid parts sting the hands and every mechanic knows it's no fun trying to make a delicate adjustment under the hood of a car when the shop floor feels like the ice floes at Little America.

Cold feet and numb fingers have been more or less traditional with the business of servicing automotive vehicles in winter weather in many parts of the country. True, there are many ways of heating shops, but as often happens, the area near the source of heat may be quite comfortable but 15 or 20 ft. away where Joe is trying to adjust a voltage regulator the condensation of his breath let's you know he's got cold feet and his hands are all thumbs.

But judging from the manner in which the service area and showroom of Paul McGlone Chevrolet in suburban Detroit, for example, is heated there's an answer to the problem of keeping service men and mechanics warm. The heating units installed here are called Panelblocs, a new type of infra-red radiant heaters.

Most automotive service areas, if heated at all, are heated with some mechanical or electrical device that heats the air, and this air in turn circulates through the working area, warming personnel. In case of an automobile repair shop, where large doors must be opened frequently, the inrush of cold air is sufficient to quickly lower temperature and place a burden on the heating system. The Panelbloc heaters work on an entirely new principle.

GENTLE, BUT PENETRATING

In operation, these heaters generate infra-red heat waves approximately four times as long as those produced by a glowing fire. This heat is gentle, but because of its wave length, penetrates to a greater depth than does visible radiant heat.

Infra-red rays act about the same as light rays. Fast as light, they dart through space and are not diverted by cold air, drafts or air currents. These rays are deposited on personnel, machinery, work benches, cars undergoing repairs and onto the floor. Upon contact with any of these objects, the rays are converted to heat. The warmed floor — and work benches — become radiant panels. That means workers in the area are sandwiched between two heat sources.

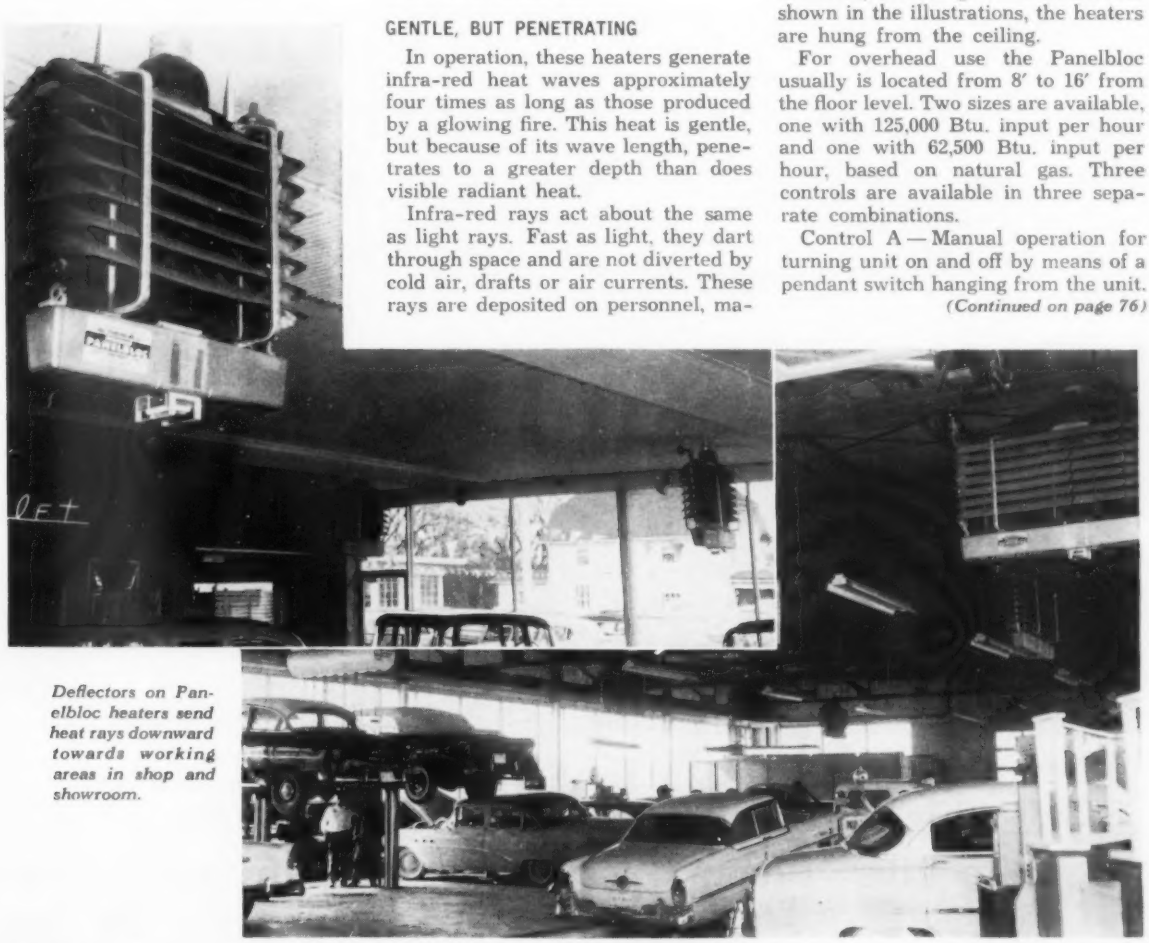
RAYS CONVERTED TO HEAT

Of course the rays that hit the workers are also converted to heat. The worker enjoys a definite feeling of warmth—just as he would from bright sunshine on a cold day. Since the rays do not heat surrounding air, opening and closing of outside doors have little effect on interior temperatures. Panelbloc heaters are available for gas firing only, although they can burn any type commercial gas that is available, according to the maker. As shown in the illustrations, the heaters are hung from the ceiling.

For overhead use the Panelbloc usually is located from 8′ to 16′ from the floor level. Two sizes are available, one with 125,000 Btu. input per hour and one with 62,500 Btu. input per hour, based on natural gas. Three controls are available in three separate combinations.

Control A — Manual operation for turning unit on and off by means of a pendant switch hanging from the unit.

(Continued on page 76)



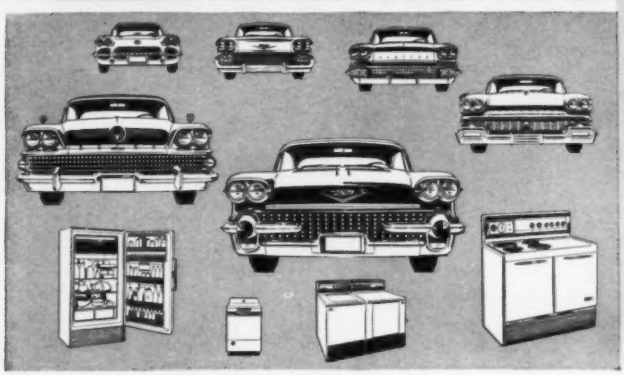
Deflectors on Panelbloc heaters send heat rays downward towards working areas in shop and showroom.

AC SELLING SLANTS

MONEY-MAKING FACTS

The General Motors "AIM TO LIVE"

For All Retailers



What is "Aim To Live"?

Whenever your customers drive at night, their safety depends on what they can see. What they can't see *can* hurt them. Repeated checks prove that more than 50% of all cars have improperly aimed headlamps and are losing as much as 80% of night vision.

In the interest of greater night driving safety, General Motors is taking the lead in promoting this vital service with this great new "Aim To Live" public service program.

The "Aim To Live" Program will be backed by powerful advertising in leading national magazines as well as on television programs sponsored by General Motors Divisions. Car owners everywhere will be urged to stop in at any authorized "Aim To Live" Headquarters point for a headlamp inspection and aiming check.

Nation-wide March-April
$100,000 Consumer Contest—116 Big Prizes!

The spring climax of the "AIM TO LIVE" program will be an exciting 60-day $100,000 safety slogan contest open to all licensed drivers during March and April. All "Aim To Live" Headquarter retailers will be provided with official entry blanks and identification signs and banners.

Join this important public service project! Back the "Aim To Live" Program for greater night-driving safety!

OF THE MONTH!

FOR DEALERS

" PROGRAM . . .

Selling Guide Headlamps

AIM TO LIVE
ENTER $100,000 AIM TO LIVE CONTEST
Come in Today
WIN A NEW '58 CAR or other valuable prizes
AIM TO LIVE
Have your headlights aimed NOW!
16 NEW 1958 CARS Given Away
AIM TO LIVE
Win one of 116 Big Prizes!
$100,000 CONTEST

ORDER YOUR STOCK OF GUIDE HEADLAMPS
TODAY FROM YOUR REGULAR AC SUPPLIER

Here's how service stations and repair shops can participate in the "Aim To Live" Program

Any service station or garage stocking Guide T-3 Headlamps and having a mechanical aimer for aiming modern headlamps (headlamps with aiming points) is considered an official "Aim To Live" station.

AC field personnel are now contacting retailers of Guide Headlamps to explain the complete program and to distribute "Aim To Live" point-of-sale identification kits

Now's the time to become an "Aim To Live" station. Order a stock of Guide Lamps from your regular AC supplier. He will see to it that the AC field man sets up your station as an official "Aim To Live" Headquarters point. You, too, can then become a part of this vital project and qualify your customers to participate in the big March-April contest.

AC

AC SPARK PLUG ❀ THE ELECTRONICS DIVISION OF GENERAL MOTORS

Watch Walt Disney Studios' ZORRO every week on ABC-TV

AC **SELLING *SLANTS***

MONEY-MAKING FACTS

Here's your value-packed

MID-WINTER DEAL ON AC PRESSURE CAPS

AC Rack—Heavy all-metal construction for wall or pump island installation. Finished in high luster AC Blue, Red and White. If you don't own an AC Cooling System Tester, why not order one of these valuable service tools also . . . available from any AC supplier for only $10.00.

This handy AC Tester Rack and "Hot Pad" Mitten are yours with an order for an FM-20 AC Pressure Cap Assortment

Two valuable service items . . . the all-metal Storage Rack (for your Anti-freeze and AC Cooling System Tester) plus a heat resistant AC "Hot Pad" Mitten for removing hot pressure caps can be yours free of extra charge. Here's how:

You buy the FM-20 Assortment at the regular price plus $4.05. You receive the Rack and the Mitten plus 3 additional popular type AC RC-9 Pressure Caps. When you sell these caps, you recover your total additional investment. Simple? You bet . . . why not place your order today?

AC FM-20 Assortment—Seven popular fast-moving pressure cap types, twelve caps in all, packed in this attractive combination shipping and display container. Just the ticket for the average service station.

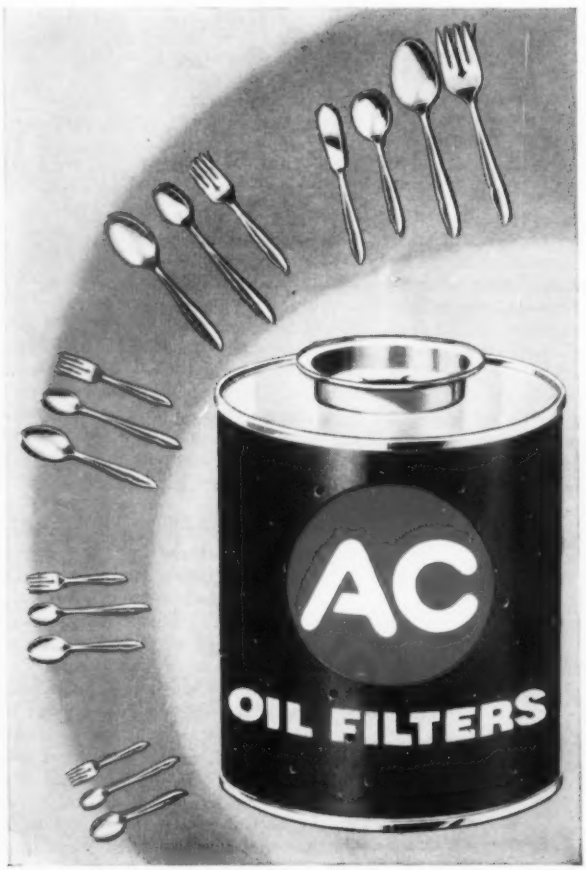
YOUR AC SUPPLIER HAS ALL THE DETAILS • CALL HIM TODAY!

OF THE MONTH !

FOR DEALERS

Presenting the Oneidacraft Tableware

FOLLOW-UP PROMOTION ON AC OIL FILTERS



FM-35 Assortment Includes: 4 place settings of 3 pieces Oval Bowl Soup Spoon, Salad Fork, Iced Drink Spoon. **Plus . . .** Butter Knife, Sugar Spoon, Large Serving Spoon, Large Serving Fork.

Complete your Oneidacraft Stainless Tableware with these 16 beautiful additional pieces

Yes, dealers everywhere have asked for the opportunity to complete their AC Oneidacraft set . . . so 16 *additional* Profile Pattern pieces are now available on that same attractive basis as the original offer released last fall.

Demand is bound to run high for this outstanding value so we urge you to act promptly . . . order an FM-35 today!

FM-35 PROMOTION

. . . no charge to you!

The deal's the same . . . you buy 24 AC Elements of your choice; pay the regular price plus $7.50. You receive the 16 pieces of Oneidacraft plus three popular AC Elements worth $7.50. When they're sold you've recovered your total additional investment.

HERE'S MORE GOOD NEWS!

If you didn't get the initial FM-31 Assortment consisting of the basic 16-piece Oneidacraft set . . . 4 Knives, 4 Forks, 8 Teaspoons, it's being reintroduced because of popular demand. This is your opportunity to secure both assortments.

AVAILABLE FROM ANY AC SUPPLIER

AC SPARK PLUG ⚛ THE ELECTRONICS DIVISION OF GENERAL MOTORS Watch Walt Disney Studios' ZORRO every week on ABC-TV

AUTOMOTIVE TECH KNOW-HOW

By GUY F. WETZEL
Technical Editor

Give it a "tune-up"

When a car owner drives into your shop and asks for a "tune-up," just what is he asking for? . . . But more important, what do you give him for his money?

● THE TERM "TUNE-UP" is one of the most poorly defined expressions used in the entire language of automotive service. Therefore, the automobile owner who takes his car to a shop and orders a "tune-up" has very little idea of what he is buying and what he will get for his money. He hopes his car will run better than it did when he took it to the shop. Usually there is some improvement, but too often defects and causes of poor operation are overlooked.

This has two bad results—(1) the owner is dissatisfied, and (2) vehicle needs that would have meant more business for the shop are not taken care of.

Tune-up prices vary widely, running from a minimum of around $5.00 to $20.00 or more. With this wide range of prices, the chances are that in general the motorist who pays $15.00 to $20.00 for a tune-up will get more proportionately for his money than one who pays five or six dollars.

Talking to the customer and getting him to answer questions like those mentioned in this article will be helpful in doing what he thinks he wants done in addition to actual power plant needs.

QUALITY OR QUANTITY?

The kind of tune-up that is performed in a shop depends to a great extent on the way the shop operates. For example, if the tune-up man or men are paid on a flat rate basis, chances are the tune-up will be done as quickly as possible with an absolute minimum of operations being performed. The men working on flat rates are paid a certain amount for doing the job, and as there is seldom a specified procedure to be followed, it is only natural that no more time be spent on the job than absolutely necessary to get by.

To illustrate what is happening in the tune-up department of many shops operated on a flat rate basis, a tune-up job in the shop of a dealer handling one of the high priced cars was recently watched with a great deal of interest.

The first thing that was done was to remove the spark plugs. Without even looking at them to note their condition, they went into the scrap barrel, and new ones were put in. Next the distributor cap came off, and the breaker points and condenser were taken out, and again without bothering to look at them, they followed the spark plugs into the scrap barrel.

NO TIME FOR CHECKING

New points and condenser were put in, with the operator lying on his stomach across the front fender to reach the distributor. A dwell meter was connected up and the engine was turned over with the starter to check the point spacing. The engine was then started up and the running dwell checked. Checking the alignment of the points would have taken time, and as long as the engine ran, and presumably would continue to run after the car was delivered to the customer, why bother with this minor matter!

Next the timing light was connected up and the ignition timing was checked. It was fairly close, so no adjustment was made. With air cleaner removed, the carburetor was adjusted by engine sound and observation to give a reasonably smooth idle. This was the tune-up for which a charge of $12.50 was made, plus parts. The total time spent on the job was under forty minutes. The battery, generating system, starting system, and wiring were *not even visually inspected*, and the voltmeter was not disturbed in its position over on the bench.

CONSCIENTIOUS SHOPS ARE BUSY

From observations in many dealer shops, this job, we are sad to say, is fairly representative of the tune-up work being done in most shops where the men work on the flat rate system, with minor variations, of course, depending on the skill and conscience of the man on the job. This type of service is one of the important reasons why so many service stations with mechanical service departments are getting a lot of the tune-up business. It is also the reason why a certain number of operators are running shops specializing in tune-up work only, and doing a thorough and highly skilled job. They charge enough to permit them to do a good tune-up job, and most of them have enough customers who want this kind of service, to enable them to schedule the jobs ahead and require motorists to come by appointment only.

Now the question logically comes up, "What should a good tune-up cover and consist of?" This brings up the three basic requirements for a running engine: compression, ignition, and carburetion. To these might be added a fourth factor, the battery and generating system.

WHAT IS A "GOOD" TUNE-UP

A tune-up to be complete must give consideration to these factors and have these objectives: (1) determine whether the engine is in condition to benefit from a tune-up; (2) check for defective parts, high resistances, and maladjustments; and (3) to put in any needed ignition system, generating system, starting system or fuel system parts, and make the necessary adjustments and corrections in accordance with factory specifications. The engine should be at operating temperature whenever a tune-up job is attempted.

A new factor is entering the tune-up and diagnosis field, in the way of a relatively new and very valuable working tool—the automotive oscilloscope. The proportion of shops that have oscilloscopes is still quite small, but the number is rapidly increasing. This instrument, as it comes to be understood and appreciated, will be found to save time in tune-up and ignition system trouble shooting, and to give information that can be gotten in no other way. Most important, it gives the information very quickly—in a matter of minutes.

The reason for mentioning the oscilloscope here is that when one is available, the very first step to be taken when a tune-up job comes into the shop is to connect the instrument and get a picture of the conditions in the power plant. An experienced operator can tell in one minute whether the engine is in condition to be benefited by a tune-up, and can get a good idea of how the ignition system is functioning, and about where the trouble causes, if any, are located.

After the oscilloscope has been used the operator will know whether there are any high resistance points in the ignition system, any shorts, general condition of the distributor cam and camshaft, distributor dwell, and in what, if any, cylinders there is ignition trouble.

The tune-up can then be followed through, omitting the check of high tension milli-amps at the spark plugs. After the job is completed, the oscilloscope can be used to advantage to check the job quickly. In the absence of the oscilloscope, the procedure outlined in the following paragraphs should be substantially followed. For general information about the automotive type oscilloscope, refer to page 70 of the August, 1957, issue of AUTOMOTIVE SERVICE DIGEST.

BATTERY IS STARTING POINT

Since so much depends on the battery, this is a logical starting point for the tune-up operations. Therefore the first thing to be done should be to check the battery gravity, which should be better than 1.250. If any one or more cells is 25 "points" (0.025) of gravity lower than the others, this indicates that the cell is shorted, the cell is about to fail, or there is a crack in the battery partition in the case. If any of these three events is present, the car owner is an excellent prospect for a new battery. If he does not replace the defective unit, he will soon be experiencing battery trouble, since it only takes one cell out of three on a 6-volt, or one cell out of six on a 12-volt battery, to put it out of commission. If the charge is low the battery should be charged, since the only truly dependable and useful battery is one that is fully charged.

Next, the battery condition and condition of the starting system can be checked by connecting a voltmeter across the battery and running the starting motor for 15 seconds. If the battery voltage does not drop below 5 volts on a 6-volt battery or 10 volts on a 12-volt battery, and the starter turns the engine over easily, at normal hot engine cranking speed, we can assume that the battery and starting system are OK. Listening to the sound of the starting motor as it turns the engine will give a clue as to engine compression.

If the battery voltage falls below the figures given, yet the gravity is above 1.250, the condition of the bat-

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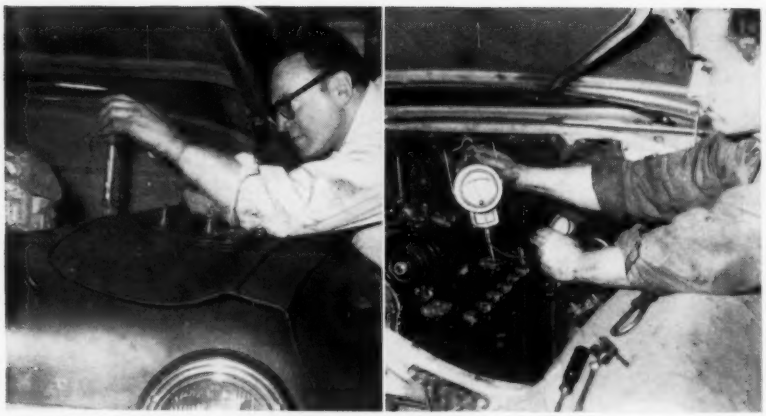


One of the first steps in a good tune-up job is to check the battery gravity, which should be 1.250 or higher. If the gravity is not within 25 "points" from the highest to the lowest cell, check each cell with the open circuit voltage tester. Any cells that are from .010 to .025 volts low are due for failure in the near future, and it only takes one cell to put a battery out of commission.

Tune-up . . . CONTINUED

tery is questionable, and further tests should be made. If the starter is sluggish, the starting system should be checked for both wiring and cables, and motor condition.

One of the operations that is appreciated by motorists, when a complete and careful tune-up is done, is to remove the battery from the car, wash off the top and hold-down frame, clean the terminal posts, then brush it with a solution of baking or washing soda, to neutralize any acid, before putting it back in place.

NEW SPARK PLUGS GOOD INSURANCE

The next logical move is to take out the spark plugs. With the high compression engines of 1955 and later, it is probably smart to discard all plugs that have gone over 3,000 miles, since plugs seem to be subject to failure with much less than the 10,000 miles plus, that we used to expect. While this hits a car owner's pocket book harder than formerly, it is insurance, more or less, that the job will make the engine run much better. Be sure to gap new plugs to factory specifications before putting them in place.

While the plugs are out of the engine it is a good time to take compression readings. These should be taken for each cylinder and recorded. All readings should be within 10 lbs. of each other. If any cylinders vary more than this amount from the lowest to the highest, trouble is indicated. Conscientious operators will use the cylinder leakage tester to pin-point the trouble and to show whether the compression leakage path is past the intake valve, past the exhaust valve, past the rings, or through a leaking head gasket.

After the plugs are reinstalled (and properly torqued), it is a good time to pull the distributor. This operation is too frequently omitted, but it is a very important part of a good tune-up. The distributor breaker points are examined, and if in good condition need not be changed; but if they show wear, poor mating, transferred metal or pitting, new ones should be installed. It is general practice to put in a new condenser when new points are put in, though actually this is seldom necessary. It is protection for the tune-up man principally, because if the old condenser should be left in place and suddenly go bad, the tune-up man would be blamed for not changing it.

TEST DISTRIBUTOR ON MACHINE

To check firing pattern, automatic advance and vacuum advance, the distributor should always be put on a distributor tester and the points adjusted for specified dwell. The dwell variation, if any, should be checked and reported. If any of the conditions are too bad, a replacement distributor should be recommended.

With the distributor back in place on the engine, start it up and check the ignition timing with a timing light and make the necessary adjustment in accordance with factory specifications. With the engine running, it is a good time to check the high tension milliamps output at the spark plugs, unless this was previously checked with the oscilloscope. This test will also check coil polarity, which should be negative at the spark plugs. In this connection, care must be used to allow for the non-metal high tension conductors with high resistance used on many of the General Motors cars, and some others. The different lengths of spark plug connectors will have different resistances and will account for different readings on the voltmeter when the H.T. coil output is checked.

The generator charging voltage is quite important, though if the battery is well charged and the owner does not have to add water more than three or four times a year, the voltage will probably be about right. With the battery gravity above 1.250 and uniform in all cells, connecting the voltmeter at the A terminal on the voltage regulator (generator control) and running the engine at about 1500 rpm until the voltage does not climb any more, will give a reasonably accurate indication of the generator controlled voltage. If the battery is below 1.250 gravity, insert a ¼ ohm resistor in the charging circuit before checking the generator voltage. If the voltage is too high or too low, make the necessary adjustment on the voltage regulator.

A complete check of the generator regulator should include a test of generator ampere output. This is done by putting a heavy load on the battery by running the starter for about 20 seconds so the voltage regulator will not operate while the current regula-

With the plugs removed, take a compression check. If any cylinder is more than 10 lb. lower than the highest, it should be tested with a cylinder leakage tester.

tor is being tested, or shunt around the voltage regulator so the current control will govern.

A quick test that will often pick out potential trouble, is to measure the voltage drop in the ignition system. To do this, get the voltage at the battery side of the coil (battery side of the resistor on 12-volt systems) to ground, and compare this with the voltage across the battery. There should not be more than 0.2 volt difference.

The only way a distributor can be tested for automatic advance, vacuum advance and firing pattern is on a distributorscope. On the unit shown there was no vacuum advance due to a ruptured diaphragm.

Checking generator voltage should be a part of all tune-up jobs. Too high a voltage will affect breaker points and lights, as well as overcharge the battery; too low a voltage will not keep battery charged.

DON'T OVERLOOK THE AIR FILTER

On all the late model cars equipped with the new paper type air cleaners, the filter cartridge should be inspected and cleaned. These units collect dust and other air borne foreign matter on the filter surface. As the amount accumulates it will tend to restrict the air flow to the carburetor. If this restriction cuts down the air flow enough to upset the fuel-air mixture, fuel mileage and performance will be unsatisfactory and may even be bad enough to make starting difficult or impossible.

The oil bath type air cleaner, when used, should also be inspected, cleaned and have new oil added if necessary. However, this type of air cleaner, when dirty, does not restrict air flow or interfere with engine operation.

Now, coming to the fuel system, the fuel pump should be tested for both pressure and delivery. Disconnect the delivery side of the pump and with the pressure gauge connected, turn over the engine with the cranking motor (ignition off or coil wire disconnected) and note if the fuel pressure is in accordance with factory specifications. Then running the engine on the fuel in the carburetor float chamber, catch the pump discharge in a container. For late model V-8's this should be one pint in 30 seconds. The pressure and discharge will indicate the condition of the fuel pump.

The other important unit in the fuel system, needless to say, is the carburetor. The usually made adjustments are the idle mixture and the idle speed. When adjusting the idle mixture either the vacuum gauge or the tachometer can be used. If it is convenient to connect the vacuum gauge, the idle mixture is adjusted to give the highest vacuum, then turned in ⅛ to ¼ turn to slightly enrich the idle mixture.

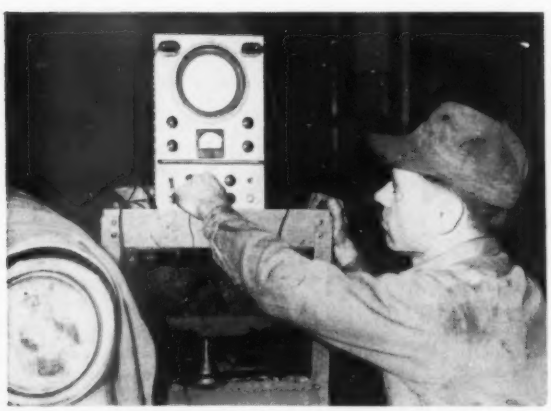
ADJUSTING THE CARBURETOR

If the tachometer is used, adjust the idle mixture screw or screws to give the highest speed without changing the throttle. In some cases a better idle adjustment can be made with the automatic transmission (on cars so equipped) shifted into D (drive) position. However, be sure the emergency brake is firmly engaged.

If there are complaints on gas mileage, acceleration, or high speed operation, it is a good idea to use the combustion analyzer to check the operation of the accelerating pump, fuel enrichment, and high speed nozzles.

With the smoothest idle established, set the throttle stop screw to give an idle speed of 450 to 475 rpm. If the car tends to creep a little bit, it then becomes a question of whether the engine will give trouble from stopping when the car makes stops for traffic signals or congestion, if the idle speed is cut down. It may even be advisable to increase the speed somewhat to keep the engine from dying. Of the two actions, it is better to have the idle speed high enough to keep the engine running. Creeping can be prevented by resting the foot on the brake pedal, which presents no hardship, as the foot is already on the pedal as the car is brought to a stop.

This completes the actual tune-up, but there are certain other minor operations and checks that will help to make the tune-up a real, complete job, and will often turn up additional work that should be done.



The use of the oscilloscope will quickly check the entire ignition system and give more information quicker than any other method.

"TOPPING OFF" THE JOB

The carburetor hold-down screws or nuts should be tightened. The same should be done to the manifold nuts. Inspect the fan belt for condition, and tighten it if this is necessary. Belts that are just a little too loose may squeal as the engine is accelerated and this is quite annoying to drivers.

Check the carburetor for correct action of the fast idle cam, for free linkage action with no excessive lost motion, and for action of the automatic choke.

The heat riser valve should be free enough to work easily. This should be checked, and if it cannot be freed

(Continued on following page)

up it should be removed and cleaned or replaced. This operation, if it is required, will justify an additional charge.

Carefully inspect the spark plug wires and wire from the distributor to the coil and recommend replacement if the insulation is dried out and cracked.

When replacing spark plugs it is a good idea to put on new rubber

On gas mileage complaints it is always a good plan to use a combustion analyzer to see how the carburetor is behaving.

sleeves unless the kind which are molded to the cable are used. The separable rubber sleeves often dry out and crack, causing plugs to misfire, especially in damp weather.

Inspect the radiator and heater hoses and recommend replacement if their condition is questionable. Inspect the exhaust system and report if the muffler or tail pipe is in bad condition. Another check, that only takes a moment but could save a life and avoid a bad accident, is to try the neutral safety switch by trying to start the engine in positions other than Drive or Park.

A tune-up job such as we have outlined here will do two things for the motorist: (1) make the engine run as well as its mechanical condition will permit, and (2) let the motorist know the condition of his engine and auxiliaries, and what, if anything, is needed to put the power plant in good operating condition.

QUESTIONNAIRE IS HELPFUL

As a suggestion for tune-up work that will be very satisfactory to the car owner, a brief questionnaire should be filled out when a car is brought into the shop. This will also be a guide to the tune-up man as to what the power plant needs; and especially what, if anything, has been unsatisfactory to the motorist or has been bothering him. This is important to the job, since a single defect that actually may be mechanically or electrically unimportant may bother the car owner, and if not corrected will lead him to think that a poor job has been done regardless of how carefully the job was handled.

These questions will bring out helpful information, and answering them should be a routine part of selling a tune-up job:—

1. Does the engine start easily: Hot ( ); Cold ( )
2. Is the gasoline mileage Good ( ); Fair ( ); Poor ( )
3. Miles since last tune-up:.....
4. Miles since spark plugs were changed.....
5. Is additional oil needed between changes?.....
6. Oil filter last changed:.....
7. Does battery need water frequently?.....
8. Any specific complaints?.....

The questions can be printed on a 4"x6" card or on the back of the work order. The answers should be recorded and passed on to the tune-up man for his information. The customer will generally be glad to answer these questions, as it will show him that the shop is interested in the job and wants to be thorough and careful.

Part of the job should be keeping a complete record of the findings, especially if it is found that additional work or parts are needed. Car owners will appreciate knowing what the condition of their power plant is.

FOLLOW A SET PROCEDURE

In any automotive shop where tune-up work is done, instead of putting a premium on short-cutting the job, a definite routine should be set up as to the procedure to be followed. This procedure should be approximately as outlined here, and the man on the job should be paid by the hour or week, and paid enough so that he can afford to be conscientious and thorough. The charge should be high enough so the prescribed operations can all be done, along with inspection operations. In regard to the price charged, the average car owner would rather pay more and get more, than to save a few dollars and get that kind of a job.

For checking Ford and Mercury distributors prior to 1957 (the full vacuum controlled type) on the car, the vacuum can be connected as shown.

To summarize the recommended tune-up procedure, here is the list of operations:

1. Test battery
2. Test starting system
3. Remove and clean battery
4. Remove, clean and inspect spark plugs
5. Check engine compression
6. Install spark plugs, either cleaned or new, properly gapped
7. Remove distributor and test on distributorscope. Install new points if necessary; set dwell
8. Set engine timing (ignition)
9. Check high tension milliamps at plugs
10. Check generator charging voltage, adjust regulator
11. Inspect air cleaner
12. Test fuel pump pressure and delivery
13. Adjust carburetor, check with combustion analyzer if necessary
14. Tighten carburetor hold down screws and manifold nuts
15. Check automatic choke
16. Inspect heat riser valve
17. Inspect high tension wires
18. Inspect and tighten fan belt
19. Inspect radiator and heater hoses
20. Inspect exhaust system

Doing a real tune-up job is good business and is entirely practical. Whether done in a dealer shop or in

(Continued on page 61)

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New 1958 TUNG-SOL Lamp & Flasher Servicing Guide Spurs Sales

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Fluorescent Magnaglo indication of a non-visible crack in a crankshaft very near to final failure.

The use of magnetism for locating cracks . . .

By E. S. HARRIS
Field Editor

The mechanic's invisible enemy

The familiar principles of magnetism and magnetic forces are being used more and more to eliminate guess-work in determining the fitness of engine and chassis parts for further use so as to cut down costly come-back jobs.

• THE AUTOMOTIVE INDUSTRY has made wide use of magnetism and magnetic forces since the time of the one-lungers. Turning a rotor between the two poles of a horseshoe magnet to make a high-tension magneto whipped up a nice hot spark for the spark plug, or passing a flywheel full of horseshoe magnets over a number of stationary coils or vice versa got them some low tension current that could energize headlamps, supply the primary current for an ignition coil, or ignite the fuel mixture through a low tension, make-and-break arrangement, if the engineer so chose.

Permanent magnets for current generating more or less faded out of the passenger vehicle picture with the passage of time, but not so magnetism and magnetic forces; for thereafter the action was confined to temporary magnets and coils and armatures to supply current through a generator or to make use of it as a power source in motors, solenoids and the like, or a high tension current source for ignition in the coil.

So magnetism and magnetic forces have long been familiar to the automotive mechanic. But the use of magnetic forces to detect cracks in engine and chassis parts may not be an application some have used, though others are using it every day to save time and money, and to eliminate costly comebacks.

PARTS FAILURE ALWAYS A POSSIBILITY

The failure of an engine or chassis part on the road is always a source of danger, trouble and expense to the operator of the vehicle. But let this part failure occur after that unit of the vehicle was recently serviced and the mechanic promptly finds he's also in this trouble-pot—right up to his ears. Once he has laid hands on a unit, all its components should thereafter be free from all wear and fatigue breakage . . . according to the customer's reasoning. And that customer can come up with some strong arguments if he has a fresh repair order in hand when his car or truck rides back home behind a wrecker or tow truck.

The mechanic himself is vulnerable to a lot of trouble and expense that the customer may never hear about when a crack is found in a crankshaft that has been carefully reground; or in an engine block that has been rebored; or a cylinder head that has had the valve seats serviced, but has not yet been returned to the engine.

As one shop operator expressed it, "Of course I don't like being on the receiving end of a come-back caused by a broken part after I've serviced the car. . . . Neither do I like to spend a lot of time machining a part, only to find later that it is cracked. But more than anything else, I'd like to be absolutely certain that there is no undiscovered crack likely to cause an accident or breakdown when I turn out an inspection job. In other words, I'd like to be as confident of my inspection as the customer who trusts me is."

LOCATING CRACKS WITH MAGNETISM

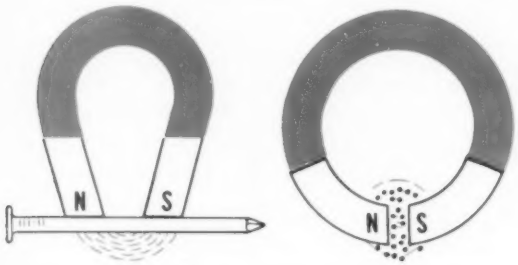
The known path of magnetic forces under given conditions is the principle used in making use of magnetism to locate cracks in ferrous (magnetic) steel and iron parts. Engineers have long traced these predictable paths of magnetic forces to design various types of electrical equipment and were thereby able to add new fields or armature circuits in a motor or generator to increase efficiency by making use of these magnetic force fields.

* *Illustrations, courtesy the Magnaflux Corp., Chicago, Ill.*

The same physical rules apply to the Magnaflux principle of locating such discontinuities as cracks and seams in metal parts, and this is our story.

CIRCULAR MAGNETIZATION

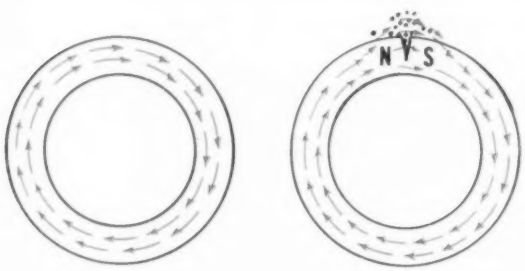
In the case of an open, or horseshoe, magnet, we have two poles—the north and south. The magnetic field be-



— A — — B —

tween those two poles will attract and hold a nail (A) and we have made other uses of this field in automotive applications and may have even traced its path on a piece of paper by scattering iron filings over the paper with the magnet's poles held directly under the paper.

If we bend the ends of the magnet towards each other until they almost touch (B), the smaller field between

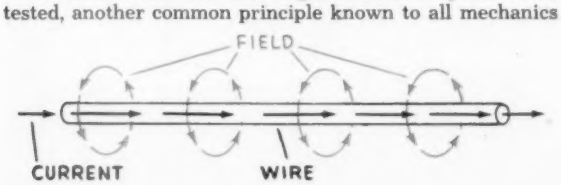


— C — — D —

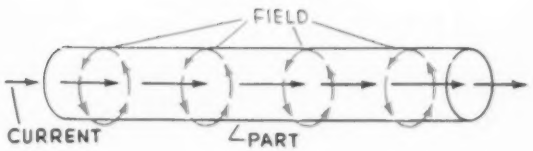
the poles will still attract and hold iron powder. But bend the magnet ends together until they close (C) and then fuse them and we have a closed magnet that will not attract or hold iron powder, for there is now no polarity and the magnetic field is in a circle inside the ring. This is known as circular magnetization.

Say we cause a crack to form along the surface of our circular magnet (D). In effect, we open Pandora's box, for the magnetic forces are no longer confined in the ring we formed, and each lip of the crack becomes a pole and a magnetic field appears between them. This magnetic field at the crack will attract iron powder and thereby build up a visible indication of the crack. This is the principle of magnaflux indications by means of circular magnetization.

To induce this circular magnetic state in parts to be tested, another common principle known to all mechanics



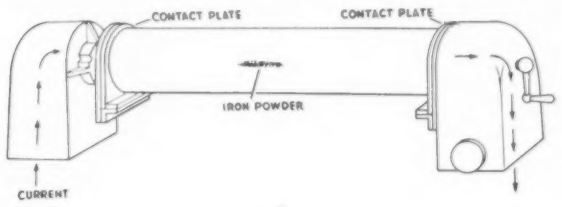
— E —



— F —

is employed. When an electrical current passes through a wire (E) it creates a magnetic field around the wire, the direction of the field being at 90° to the direction of the current.

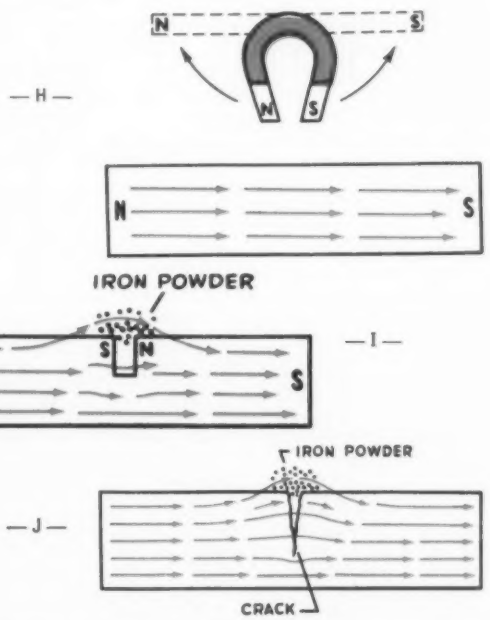
By passing a current through a part and creating a magnetic field within the part and creating a magnetic field within the part (F) we are following the same principle to create circular magnetization, and this is the



— G —

principle used by Magnaflux to detect lengthwise cracks.

The part is set up in the Magnaflux unit and an electric current is passed through the part or through a conductor within the part (G). The circular magnetic field thus created cuts across any crack in the part to attract and hold iron powder to indicate the invisible defects. Electricity is always passed through the part parallel to the defects to be found.



— H — — I — — J —

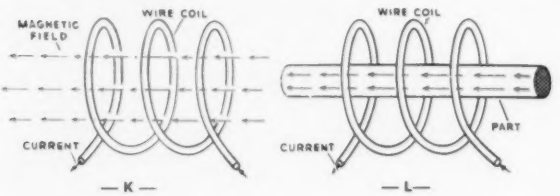
LONGITUDINAL MAGNETIZATION

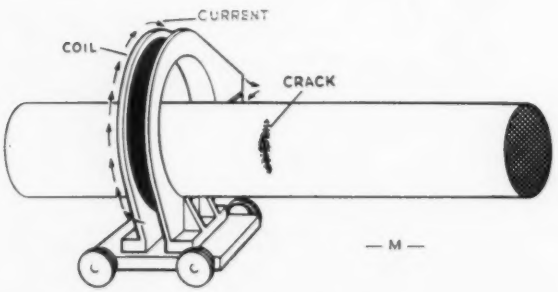
Starting again with a horseshoe magnet with its north and south pole, straighten it out into a bar and we have a bar magnet with a north and south pole (H) with lines of magnetic force traveling in a straight line through it.

(Continued on following page)

The Invisible Enemy . . . CONTINUED

Then cut a slot across the bar (a discontinuity) and two new opposite poles will appear at that point, one at each edge of the slot (I). The magnetic field between these slot poles will attract and hold iron powder. This is the Magnaflux indication of a crack or slot located by means of longitudinal magnetism (J) with the magnetic





field running lengthwise through the part.

The principle employed to create longitudinal magnetization is the same used in solenoid switches, coils and the like. An electric current passing through a wire wound into a coil (K) creates a magnetic field lengthwise inside the coil, and any part placed inside a coil carrying electric current receives a magnetic field running lengthwise (L), and this is called longitudinal magnetization.

This system is used for detecting transverse cracks in a part. When a current is passed through a coil held around the part (M) it forms a longitudinal magnetic field cutting across cracks to attract and hold iron powder to locate them for the operator.

This takes care of the electrical-magnetic principles involved, but leaves the methods of creating the magnetic fields and of applying the tell-tale iron powder and techniques of inspecting parts for cracks.

In situations where the part for testing has been removed from the unit and can be set up in a Magnaflux machine (which is available in several sizes for various applications), the setup is made similarly to positioning work in a lathe between centers, inasmuch as the machine has a headstock and tailstock.

The size and shape of the part to be checked dictates whether the current will be passed through it directly, or possibly through another conductor leading from the headstock to tailstock of the Magnaflux unit and passing the conductor through the part to be tested. This is the "head shot" which passes the electrical current through the part lengthwise to form a circular magnetic field around the part to locate lengthwise cracks. Electricity is passed through the part parallel to the defects to be found.

In order to check for transverse (crosswise) cracks, a coil is placed around the part, the current passing through the coil magnetizing the part lengthwise. This is known as the "coil shot."

Of course the tell-tale iron powder must be introduced and passed over the part so it will be attracted and held by the magnetic fields formed at the crack lips, and this may be done either by the wet or dry method.

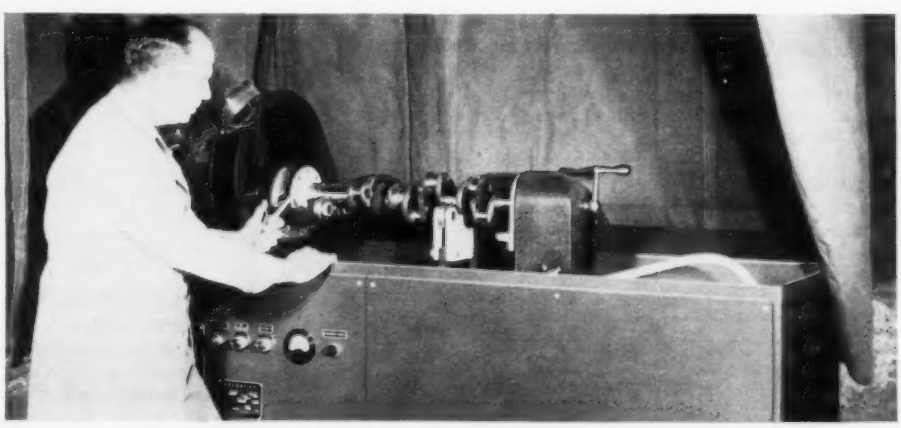
In the permanently-installed Magnaflux machine the wet or "bath" method of application is used for making the tests.

The recirculating bath is stored in a tank under the test portion of the machine and is moved by a motor driven pump. There is also an agitator to keep the components well mixed. This bath consists of one or two mixtures, depending on whether a "blacklight" is used, in which case Magnaglo paste is mixed with some light oil distillate. If the blacklight is not used, the regular Magnaflux paste is mixed with the oil.

CONTINUOUS AND RESIDUAL METHODS OF TESTING

For the continuous method of testing the bath is passed over the part at the same time the magnetizing current is being applied. The bath is flowed over the part through the hose, and then the flow is stopped when the nozzle is closed. The current switch is closed at the same instant the nozzle is closed; thus the current is passed through the part while the bath particles are draining heavily over the surface. The current strength is held high enough to show any expected defects but not so high as to cause particles to build up along flow lines or change of section in the shape of the part.

In the residual method of testing the bath is applied after the current has been shut off, and is used only on hard steels like high carbon or alloy steels in the hard state which can hold a magnetic field. The current is passed through the part or coil to magnetize the part, and is then shut off. This leaves a residual magnetic field in



A permanently installed Magnaflux machine in which parts to be checked are set up between centers, as in a lathe.

This rod looked good to the naked eye, but fluorescent Magnaglo indications turned up cracks which warned of approaching failure.

parts made of these retentive materials. Then the bath is applied by the hose or the part is dipped in a separate tank of agitated bath and any cracks will be covered by steel powder retained by the magnetic field in their area.

The dry method of testing entails the use of dry powder instead of the paste and oil mixture and is found to be particularly sensitive in locating cracks not open to the surface. A line of dry powder will adhere to the surface of a casting undergoing test when the crack is on the opposite side or under its surface.

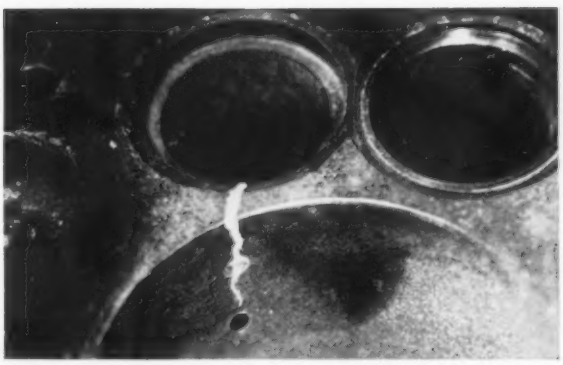
PORTABLE UNITS PERMIT ON-THE-CAR TESTING

Besides the several sizes of permanent shop Magnaflux units, some having black light hoods when Magnaglo Black Light is used for quicker identification of cracks, there are several light, portable units suitable for various types of inspections where the part is still on the vehicle, or for small volume operations where the larger machines are not required.

Spindles, axles, frame members, steering arms, housings, etc., can be tested for safety while still mounted to save disassembly time and still avoid possible breakdown. Smaller parts can be inspected at the bench during overhaul with the portable units.

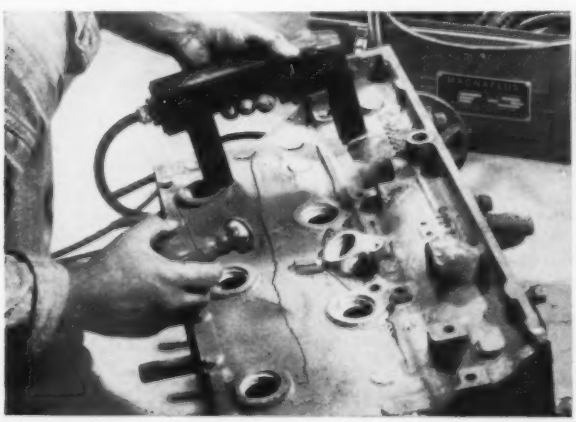
Magnetic fields can be A.C. or D.C., as required by the inspection jobs. In the automotive overhaul field the surface defects are nearly always the most important, so the non-penetrating A.C. current is used for magnetization of these parts. With alternating current the surface indications show up quickly, while the irrelevant subsurface indications, which might confuse or delay the inspector, do not form.

Automotive parts should be thoroughly demagnetized after testing, and this may be done either by a separate demagnetizing unit or by the machine itself, depending on its type. The technique for this demagnetization varies with the size and type of the part, for it is accomplished by reversing polarity field in the part. It is progressively reduced from high to low strength in small steps.



How test showed up a cylinder-to-valve port crack.

One type of portable unit, being used here to inspect a truck spindle.



Blocks to be rebuilt should always be thoroughly checked for cracks or other flaws.

The unit shown here is being used for in-place inspection of a truck's highly stressed rear axle and housing.

By GUY F. WETZEL
Technical Editor

Servicing hydraulic valve lifters

The hydraulic valve lifter has something in common with an iceberg or a Gay Nineties bathing beauty—there is much more to it than meets the eye!

• THE FUNCTION OF hydraulic lifters in engines is generally thought of by men in the service shops, to be one of making engines run more quietly. The lifters do this by eliminating the necessity of valve lash, required in valve trains where mechanical tappets are used.

But this is only half of the story, which can be better understood by considering what happens in an engine as it heats up when started cold, and then operates continuously to drive the car.

VALVES HEAT UP FIRST

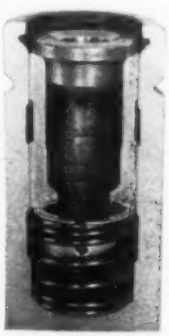
The first parts to heat up on OHV engines are the valves, especially the exhaust valves which are always directly in the path of the hot exhaust gases from the time the engine starts. As the engine operates, the head and block gradually get up to normal operating temperature. Finally the valve push rods, too, will get up to operating temperature, but this will take quite a while since the ends of the push rods contact only the valve lifters at their lower ends and the rocker arms at their upper ends.

The result of this heating routine is that the tappet clearance or valve lash in valve trains with mechanical tappets, will vary considerably during the heating process. This clearance will run all the way from the cold clearance (which is greater than the specified hot running clearance) to less than zero clearance on some engines, when the valves are hot but the cylinder block and head are still relatively cool. That is to say, the extremely uneven or spotty engine warm-up, as the different parts heat at different rates, actually causes the valves to hold open a few thousandths of an inch for a minute or two, due to the clearance being entirely absorbed temporarily by uneven heat expansion of the various metal parts of the engine.

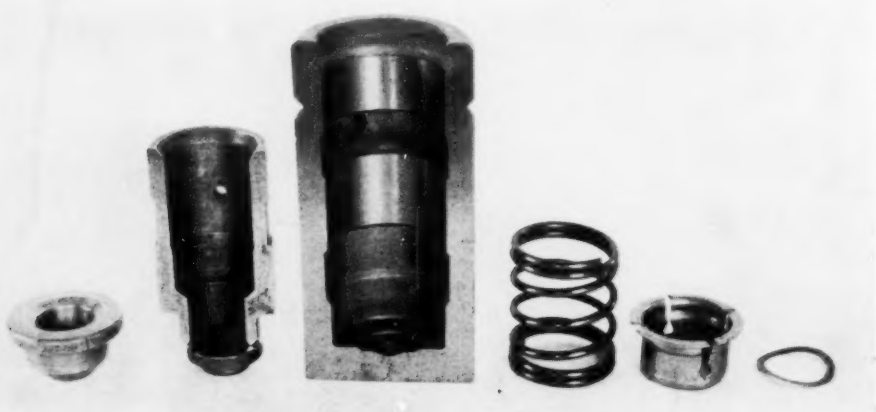
UNDER LOAD VALVE LASH VARIES

With the specified hot running valve lash correctly set with mechanical tappets, the valve timing will be approximately correct when the engine is at normal operating temperature. But under different load and speed temperature conditions, relative temperatures of different engine parts will vary, causing variation in the opening and closing of the valves. Such variation cuts down engine operating efficiency and reduces fuel mileage. This is an important factor, especially in truck operation, and is the main reason why hydraulic tappets are being used in truck engines.

These facts, perhaps new to most



Cross section of hydraulic tappet using flat check valve with lapped surface and lapped valve seat. Shown are tappet body and plunger, the spring of which has a 4-6 lb. force.



Parts of the hydraulic tappet. Left to right: plunger cap, plunger and valve, tappet body, spring, valve cage and wave washer, which acts as a valve spring.

Install POWER TIP to "fire up" today's engines at all speeds!

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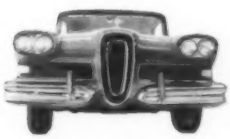
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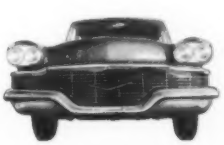
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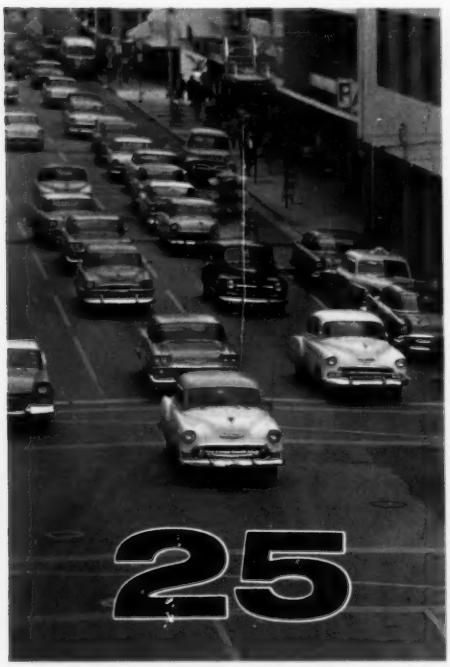
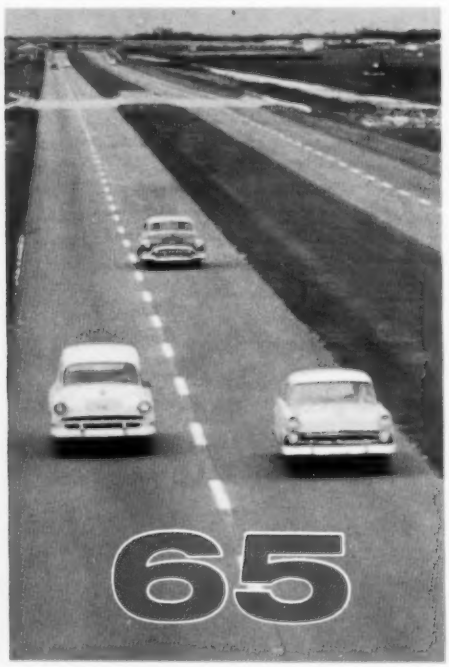


IN TOWN TRAFFIC . . . *some spark plugs, designed for high speeds, become fouled and cause misfiring and loss of power when driven at low speeds.*



ON THE HIGHWAY . . . *some spark plugs, designed for low speeds, misfire causing power loss and invite destructive pre-ignition when driven at high speeds. Why gamble when . . .*

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mechanics, have been learned and verified by use of an optical device developed by the Chicago Screw Co., makers of hydraulic valve lifters. This device actually measures the true valve lash continuously on a running engine. This device disclosed the somewhat surprising changes in lash in the valve train under different engine operating conditions.

CAMS HAVE QUIETING RAMPS

In designing cams for a camshaft which is to operate in an engine equipped with mechanical tappets, it is necessary to provide "quieting ramps" at the valve opening and valve closing portions of the cam. This is to take up the lash in the valve train at a relatively low speed when the valve is opened, and should be sufficient to allow the valve to close with comparative gentleness as it contacts the valve seat. If it were not for the quieting ramps, the jar and clash of suddenly taking up the lash, and then letting the valves crash onto the valve seats, would result in broken valves, besides being much too noisy.

The quieting ramp is designed to work with the specified tappet clearance. If the clearance is larger than it should be, there will be some harshness in the valve action, and if it is smaller, there will be danger of valves not closing, resulting in burned valves.

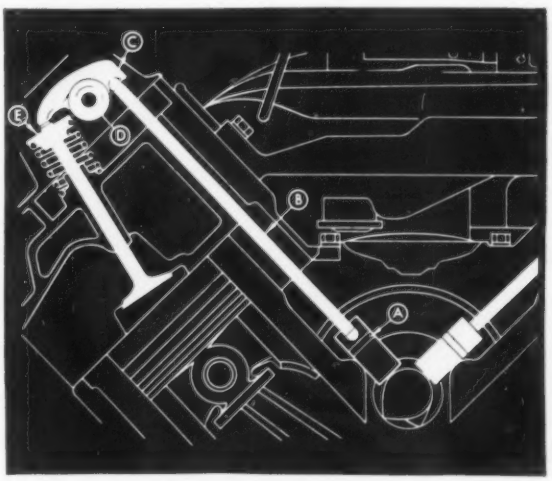
At all times, when the engine is either above or below, normal operating temperature, the amount of lash will be either more or less than it should be. Every deviation from the design clearance will change the valve timing. So it will be evident that instead of the valve timing being fixed and invariable, it is continually changing as engine conditions change. This change is much greater than is generally recognized, and may throw the exhaust valve opening off as much as 45° to 60° of crankshaft rotation and increase the valve overlap by as much as 80%.

STABILIZES VALVE OPERATION

In view of what happens in the valve operating system of high output V-8 engines with mechanical tappets, the desirability to stabilize valve operation is evident. This is the important function of the hydraulic tappet. This device automatically compensates for changes in the dimensions of all engine parts, due to heat that affects valve action, and maintain the timing of all the valve events precisely at the settings built into the valve operating cams on the camshaft.

Hydraulic tappets, used with engines driving through automatic transmissions, improve engine idle and minimize creeping when the car is standing still with the transmission in "Drive."

Since hydraulic lifters will be evident as long as piston engines are used, and their use will increase, those in the service business should know the principles of their operation, and how to detect and correct defective operation, should it occur. One point to keep in mind is that many cases of "defective operation" are not primarily due to the tappets, but to other causes, or a lack of understanding on the part of the mechanic.



Valve linkage on a V-8 engine with hydraulic tappets. A, hydraulic tappet; B, push rod; C, rocker arm; D, rocker arm shaft and E, valve spring retainer.

HOW THEY MAINTAIN ZERO LASH

Hydraulic tappets operate to maintain zero lash in the valve train without danger of holding valves open when they should be closed. Oil under the normal pressure of the engine lubricating system is conducted to the valve tappet guides through passages in the engine block, and then through properly located holes to the inside of the tappet plunger, or through hollow push rods to the interior of the plunger. The oil passes through a check valve in the bottom of the plunger into a pressure chamber under the plunger, in the tappet body, to maintain a solid volume of oil in the pressure chamber. A spring with about 4 lb. force under the plunger, holds the top of the plunger tight against the lower end of the push rod and takes up all the lash in the valve train.

As the cam lifts the tappet, the oil in the pressure chamber, being almost non-compressible, forces the plunger upward with the tappet body, putting pressure on the push rod to operate the rocker arm and open the valve against spring pressure. The pressure of the plunger spring plus the pressure due to oil pressure from the engine oil pump is so much less than the force it takes to open a valve against its valve spring pressure, that there is no danger whatever of the valve being held open, under normal operating conditions.

There is a clearance between the plunger and the tappet body bore of around .0003" to .0005" which is just sufficient to permit "leak-down" at a slow rate due to oil seeping out between the plunger and the tappet body bore.

The oil pressure in the pressure chamber of the tappet, due to compressing the valve spring, will exceed 500 p.s.i., and in addition there will be additional pressure from the inertia of setting the valve train in motion, which may get as high as 1,200 p.s.i. This high pressure will cause a little leakage and resulting oil loss past the plunger on each valve opening. As the lifter once more contacts the heel or base circle of the cam, engine oil pressure will cause oil to replace that which was lost on the last valve opening, and thus will maintain a full pressure chamber in the tappet, ready for the next valve opening.

TWO TYPES OF CHECK VALVES

There are two kinds of check valves used, (1) ball, and (2) flat disc. The ball used as a check valve may float free, or may have a tiny spring under it. Having a relatively small surface, these balls cause a certain amount of lifter trouble by being worn and permitting too rapid leak-down. The flat check valve, as made by the Chicago Screw Co., is about three times the diameter of the ball check, and has a lapped, flat surface. This surface makes contact with a narrow seat on the plunger end, which is in the form of a ring about 1/32" wide which is also lapped. The contact of the two lapped

(Continued on following page)

surfaces makes an excellent, oil tight joint. A slight sidewise movement of the valve disc is permitted, and this movement has slight wiping motion which helps to keep the seating surface clean. The disc is held against the seat by a "wave washer" which is a thin wavy spring ring. Because of the relatively large diameter of the valve seat, only a very small movement of the valve is necessary to permit the inflow of the oil required to compensate for the loss due to leak-down.

The result of the action of the plunger in the tappet body is that any changes in the dimensions of all the engine parts that affect valve action are automatically offset by the alternate leak-down and refilling of the pressure chamber. Thus there is no variation in the valve timing, regardless of changes in engine speed, engine load, and engine temperature.

The total allowable movement of the plunger in the tappet body is about 3/16". The desirable location, when the engine is operating, is to have the plunger in the middle of its maximum stroke. This will allow up and down movement in the tappet body, of 3/32" or approximately .090". As long as the plunger does not hit the top spring wire retainer or the bottom of the tappet body, each tappet will work properly unless the plunger is stuck or should happen to have an excessive leak-down rate, with other conditions normal.

As long as the hydraulic lifters work quietly and as they should, they can be ignored. But when noise develops in the valve train, the condition must be corrected. The conditions that will be encountered are:

(1) Complete failure, when all or many of the tappets are noisy
(2) Single tappet noise
(3) Intermittent noise
(4) Starting noise.

Improper tappet operation is not always caused by the tappets themselves, but may be the result of some other condition.

COMPLETE FAILURE

This type of failure may be caused by anything that may interrupt the supply of oil normally sent to the tappets. For example, the loss or removal of the drain plug in the oil pan could allow loss of the engine oil supply. There have been cases where this has happened, and the noise made by the lifters called attention to the fact before serious damage was done to the engine by lack of oil.

Strange as it may seem, too much oil in the oil pan can cause excessive tappet noise and apparent failure. If the oil level is raised above a certain point, such as the baffle in the oil pan where the foam can rise to a point to be reached by the crankshaft, the entire oil supply will be whipped into foam, and so much air will be entrained in the oil that the pressure will drop and make the mixture of air and oil so compressible as to make the tappets inoperative. This may cause serious damage to bearings and other parts, as well as possible valve breakage.

Another cause of tappet failure may be water leaking into the oil supply especially where ethylene glycol type of anti-freeze is used. If this should be the case, the tappets will gradually become more noisy. Also, starting the engine would be increasingly difficult because the coating on the pistons from the ethylene glycol would require much more than normal torque to turn the engine over.

An air leak in the inlet side of the oil pump can also cause failure of the hydraulic tappets. This can supply sufficient air to drop the oil pressure and make the fluid compressible enough to cause noise. Such noise will be due to the valve seating at cam flank velocity instead of at ramp velocity.

Any condition that can cause the oil pressure to drop, such as a burned out bearing or any unusual loss of oil from the lubricating system can cause unsatisfactory operation of the tappets. The noise may appear in the form of general clatter at idling after long, hard running. This condition would cause the oil to be thinned down so that leak-down would be higher than normal and there would be insufficient oil in the pressure chamber.

Note that the types of failure mentioned are not due to faults with hydraulic lifters, but rather to troubles in the engine lubricating system. This should be kept in mind any time that all or several of the lifters are noisy.

SINGLE TAPPET NOISE

Noise due to a single tappet may be caused by a faulty tappet, such as one having a very fast leak-down. This would not show up with cold oil and usually would make no noise with the engine running at operating speeds, but would be heard as a rather slight noise when the engine is idling and particularly when the oil is hot. This type of failure is not dangerous to the extent of causing any breakage, and does not affect the operation of the engine during normal operating speeds, but only provides an annoying noise when the engine is idling with hot oil. In such cases the noisy tappet should be replaced.

The particular tappet causing the noise may be located by pressing against the spring end of the rocker arm with the fingers, if the oil is not too hot, or with a wooden hammer handle. The wooden hammer handle will amplify the noise and shock of the valve seating, and this noise will be carried clearly through the wood. The stethoscope can also be used for comparing the sounds of the various tappets.

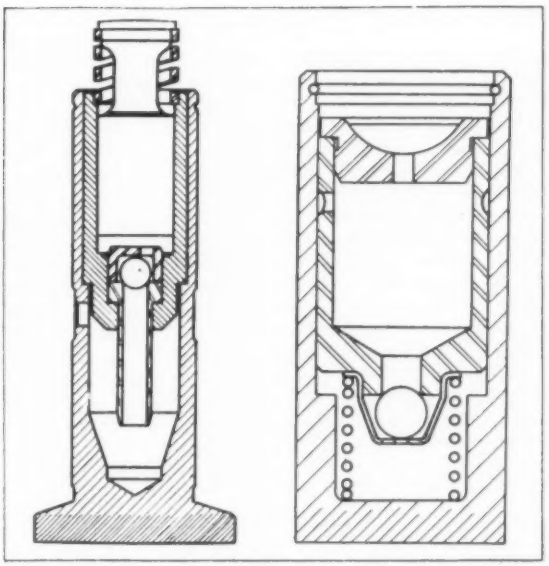
To prove that leak-down is a cause of noisy operation, a comparison between tappets can be made by pushing on the valve end of the rocker arm to hold the valve slightly open so the tappet over-fills. This will upset the engine idle because of the valve being held open, and the time required for

Locating noisy tappets with a Soundscope. By placing the prod of the instrument on each rocker arm in turn, the noisy tappet can be quickly identified.

In the absence of a Soundscope, noisy tappets can be located by placing the end of a hammer handle against the side of each tappet to amplify the sound.

the engine to get back to normal can be noted. This will indicate the relative leak-down rate of the hydraulic units.

In some cases the tappet may be stuck completely down at the bottom of its travel, and the valve will be operated with full dry tappet clearance, which will be from ⅛" to 3/16". It is dangerous to operate an engine at high speed with this condition, as valve breakage will probably take place. Such a tappet may be located in the same way as previously described for a noisy tappet with fast leak-down. The tappet should be replaced. The fact that it is stuck in its lowest position can be proven by stopping the engine with this tappet on the heel of the cam. Pushing up and down on the push-rod end of the rocker arm will show up the excessive lash quite readily.



Two other types of hydraulic tappets. On the left is an older type, used on some trucks. On the right is the type using a ball check valve. Some tappets of this type use a tiny coil spring under the ball.

FIND AND CORRECT THE CAUSE

When a tappet does stick, it is important to find the reason so that a replacement tappet will not stick for the same reason. The sticking may be due to excessive dirt or possibly ethylene glycol in the oil. In either case steps should be taken to prevent a recurrence of the trouble. The oil cleaner or filter should be examined and if it indicates that it has not been changed for some time, it should be replaced, and the oil drained and replaced with fresh oil of the proper grade. In extreme cases it may be advisable to remove and clean the oil pan.

It will pay to disassemble the tappet and examine it for indications of the cause of the failure. A burned out bearing or scored parts of the engine will possibly free metallic particles in the oil. These could accumulate and cause a tappet to stick. This would necessitate a thorough cleaning of the engine and replacement of damaged parts.

A sticky rocker arm is another possible cause of a single tappet noise. This can be checked by holding down on the valve end of the rocker arm, which will force the rocker arm to maintain its position against the valve stem. In normal operation the spring in the hydraulic unit, which is only 4 to 6 pounds, is the only available force to move the rocker arm. If the rocker arm is tight on the shaft it can prevent the hydraulic lifter from refilling. By holding down on the valve end of a suspected sticky rocker arm, you can assist the spring and the noisy tappet or tappets should operate quietly.

A worn valve guide or a misaligned valve seat may cause one or more tappets to be noisy. This can usually be checked by rotating the valve spring about 180°, also by pulling sideways on the valve stem with a cord or wire. If this should stop the noise temporarily and the noise returns again after the spring has worked its way back to the original position, it may be assumed that something is wrong with the seating of the valves. A bent valve stem will give the same result. Replacing the tappet will not correct trouble of this kind. This is usually not a loud noise and ordinarily will do no harm at high speed operation.

Sticking valves, due to gum or other accumulations on the valve stem which prevents full closing of the valve will cause a tappet noise, but it is accompanied by very irregular operation of the engine because the valve is holding open. The mileage on the car and engine condition may indicate that a valve job is advisable, though putting a good solvent through the engine may dissolve the stem deposits and rectify the trouble. Gum deposits on valve stems may be due to the type of gasoline used, poor crankcase ventilation, or the kind of engine oil that is used.

MUST OPERATE FREELY IN GUIDE!

Occasionally, the tappet will stick in the guide. This will prevent the unit from compensating and will cause a single noisy tappet. It is occasionally caused by nicks or burrs from rough handling, or from gum accumulations. Always check replacement tappets in their guides for free operation when they are installed.

Any condition in the lubrication system that prevents oil from getting to a single tappet will cause that tappet to be noisy. Whenever a tappet is removed a check should be made to see that its oil supply passages are not plugged or restricted.

There are cases when some condition causes scoring to start between the cam and the bottom surface or face of the tappet. This may cause

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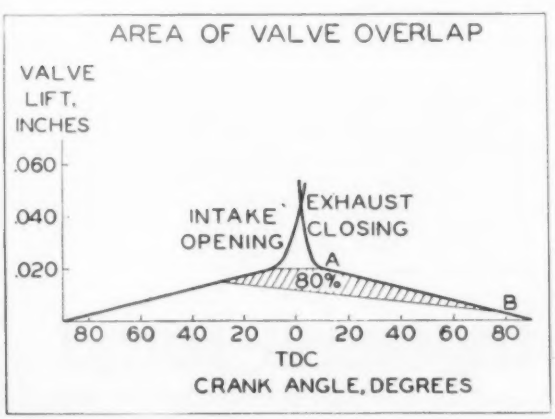

Diagram illustrating the area of valve overlap. The two curves, graphically showing the relationship of valve lift and crank angle degrees, enclose an area which is proportional to valve overlap. With mechanical tappets there may be a variation of as much as 80% with changes in temperature in the various engine parts.

Valve Lifters . . . CONTINUED

such an irregular shape on the face of the tappet and the nose of the cam to appear as a noisy tappet, or show poor performance of the engine, indicating a lame cylinder. This condition can be checked by measuring the lift of the valve. The valve lift can be measured by shimming between the end of rocker arm and the valve stem until the hydraulic unit is bottomed, and the valve may even be held off its seat slightly. The actual lift can be measured and compared with the other valves or with the lift specification.

The mileage on the engine should be taken into account, since on older engines there may be a considerable amount of wear which has occurred gradually and may not cause any trouble. But if there is more than normal wear on a low mileage car, along with performance indicating a weak cylinder, it is logical to assume that the cam and tappet face are damaged.

INTERMITTENT NOISE

Intermittent noise may be a clatter at idling after hard running of the engine which may be caused by excessive oil or too little oil in the crankcase. An air leak on the inlet side of the oil pump or low pressure because of a worn oil pump or badly worn bearings, with resulting lower oil pressure, could be the cause of this noise.

STARTING NOISE

Noise when the engine is first started up may be due to slight sticking of the hydraulic lifters so that a little time and some degree of warm-up is required to get the oil under pressure into the tappet body and the plunger into operating position. This could also be an indication of anti-freeze leaking into the oil from a leaking cylinder head gasket or other point. If the starting noise is due to a small amount of anti-freeze in the oil, it may quiet as soon as the oil temperature rises to a point where the deposit will soften.

CLEAN AND INSPECT TAPPET BODY

On an engine where valves are reground or replaced, the hydraulic valve lifters should always be cleaned and inspected. After long periods of use, a deposit is formed in the tappet body above the normal operating position of the plunger which prevents the plunger from moving above this

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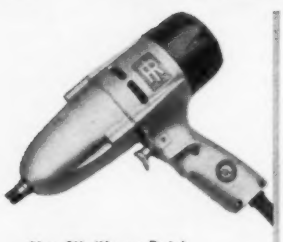

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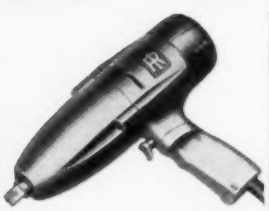

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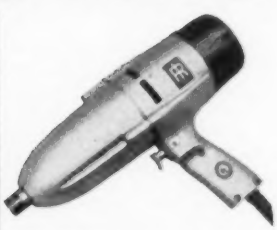

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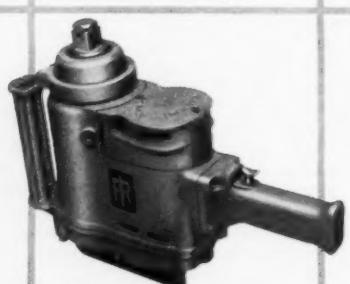

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position. Because of the fact that they fill with oil to this point, as the effort is made to move the plunger, it will not go down very fast, so it appears to be stuck. However, this is not the case, since when a hydraulic tappet sticks, it sticks in a position all the way down to the very bottom of its travel.

Hydraulic valve lifters are easily taken apart, by removing the spring wire lock or retainer that limits the outward movement of the plunger, removing the cap on top of the plunger, check valve retainer, check valve and plunger spring. In handling and cleaning hydraulic tappets, a clean working area must be provided, such as covering the work area with clean paper or by carefully washing the bench top, watching to see that no splinters or filings or any other foreign matter are present to get on the parts.

It is essential to remember that the parts of the individual tappets were all selectively fitted when originally assembled, and that they are not interchangeable. Therefore they must be handled without danger of any parts being mixed up. Soak the tappets in a solvent that will remove the deposits and permit disassembly. When the parts are removed, inspect them carefully for scoring or excessive wear. Check the valves with extreme care, especially the ball type.

ASSEMBLING THE UNIT

To assemble the ball check valve type, drop the plunger spring to the bottom of the tappet body with ball cage on top and the ball in place in the cage. Then insert the plunger and plunger cap. With a screw driver, press down on the plunger and insert the spring-wire retainer.

To asemble the tappets with flat check valves, place each spring on a flat surface, with each valve cage on top of the spring. Drop the thin wave washer, which is the valve spring, into the valve cage, making sure that it lies flat in the valve cage. Now place the flat valve with the projection downward, and see that the projection extends through the hole in the valve cage. Place the reduced portion of the plunger into the cage. Invert this assembly, and place the tappet body down over it. With these parts in proper positions, their correct assembly can be checked by looking into the top of the plunger and noticing the drill center in the center of the flat valve. For final assembly, the

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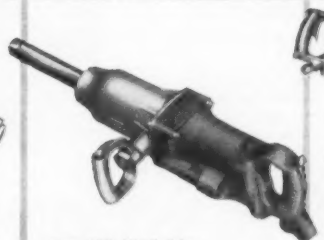

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Valve Lifters . . . CONTINUED

plunger cap is put in place and then the plunger can be pushed down with a screw driver or by having a ¼" drill in a drill press and forcing the plunger down, while the spring wire retainer is slipped into place. For testing the tappet it is best not to insert the cap and plunger retainer, unless a drill or arbor press or tappet testing fixture may be available, in which case the final assembly may be completed, as the press can be used to pump the tappet to remove the air.

To fill a flat-valve type of tappet for testing, set it upright submerged in kerosene which is clean. With a pointed tool, push the flat valve down slightly, which will permit entrapped air bubbles to escape. Do not push the valve down all the way, but just enough to open it. After no more air bubbles are to be seen put the plunger cap and wire retainer in place. The tappet can be tested by pressing down on it with a Phillips screw driver and noting whether there is suitable resistance as the plunger slowly moves to the bottom of its stroke. If the tappet is defective, the plunger will move down fairly rapidly.

If a drill or arbor press is available, or a tappet testing fixture is on hand, submerge the assembled tappet in clean kerosene and pump it up and down until there are no more signs of air coming out of it. Test it by applying pressure on the plunger cap and observe the relative amount of resistance as the plunger sinks to the bottom of its stroke. If there is any doubt, compare the tappet with one known to be good. After testing, submerge the tappet in clean engine oil and pump it to get oil into the pressure chamber. The small amount of kerosene that may remain in the tappet can be ignored, as it will have no adverse effect.

When tappets that have been filled with oil are installed in an engine, they can be expected to run quietly in a very few minutes. If noise persists after considerable running of the engine with a set of tappets which were previously satisfactory the reason probably is that something slipped in the assembly. The flat wave washer may be out of place or could be on top of the valve instead of under it. With the ball valve type of tappet, it is possible that the ball may have been left out, in which case the tappet would have no resistance against plunger movement.

TROUBLE SHOOTING NOISY TAPPETS

Where more than one tappet is noisy consider the following:

1. Oil level.
2. Idling oil pressure.
3. Excessive dirt in the engine.
4. Water or anti-freeze in the oil.
5. Improper grade of oil for the engine temperature.

For a single noisy tappet the following should be considered:

1. Check the clearance of the stuck unit with tappet body on the base circle or heel of the cam.
2. Fast leak-down — check by pushing down on the push rod end of the rocker arm, noting how fast the noise increases.
3. Tight rocker arm—check by pressing down on the valve end of the rocker arm.
4. Worn guide or misalignment of valve set—turn valve spring to check, or pull sideways on valve.
5. Worn cam or valve face—measure lift of valve.

We are indebted to the Chicago Screw Co. and to Mr. Carl Voorhies, Chief Engineer of the Tappet Division, for much of the information presented in this article.

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Say You Saw It In
Automotive Service Digest

That All-Important Heat Control Valve

The importance of proper operation of the manifold heat control valve cannot be over emphasized. The manifold heat control valve must be operating properly to obtain proper fuel vaporization and efficient engine operation.

Improper operation of this valve may result in: slow warm up, engine stalling, stumble on acceleration and poor fuel economy. Hence, it is recommended that the manifold heat control valve operation be tested and the valve shaft suitably lubricated at 1,000 mile intervals—preferably at vehicle lubrication periods and as an operation of the engine tune-up procedure.

CHECK COUNTERWEIGHT ROTATION

To test the operation of the manifold heat control valve, Chrysler, in a recent service bulletin, recommends the following procedure:

With the car standing, the exhaust manifold cold, and the engine idling, accelerate to wide open throttle momentarily and release the accelerator quickly. Observe the manifold heat control counterweight—it should rotate clockwise approximately ½" and return to the closed valve position with the release of the accelerator. If no movement is observed, or the valve does not return to the closed position, the valve shaft may be binding or the thermostatic coil may be weak or broken.

To check the heat control valve shaft manually, grasp the counterweight and rotate it back and forth. Failure to rotate freely may indicate a binding or stuck shaft. Free rotation but failure to return to closed position may indicate a weak or broken thermostatic coil and should be replaced with a new thermostatic coil.

SHAFT MUST ROTATE FREELY

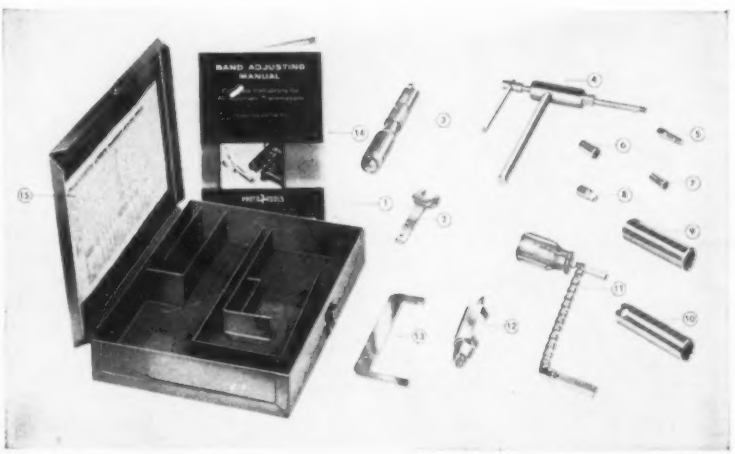
To free up a binding shaft, saturate both ends of the shaft with a suitable solvent and allow it to soak for several minutes. Loosen the shaft by rotating it back and forth several times until the shaft can be rotated easily with fingers. If the shaft is stuck tightly, tap the ends of the shaft lightly with a hammer (after the shaft is saturated with solvent) to break it loose from the manifold, and then rotate the shaft back and forth to free it up.

As a safety measure, solvent should only be applied when the manifold is cool.

Say You Saw It In
Automotive Service Digest

EASIER, QUICKER BAND ADJUSTING

Proto's simplified set makes factory recommended band adjustments on all automatic transmissions with fewer tools... less cost



PART NO.	DESCRIPTION
1. 9973	Partitioned Metal Box (10¹⁵⁄₁₆" x 8" x 1½")
2. 2356	Wrench—open end (⅝")
3. 6061F	Torque Wrench (¼" drive)
4. 2357	Band Adjuster
5. 4742	Allen Hex Socket (¼" hex, ¼" drive)
6. 4710S	Socket—8 point (⅝₁₆" op., ⅜" drive)
7. 4710	Socket—6 point (⅝₁₆" op., ⅜" drive)
8. 4743	Screwdriver bit (⅝" bit, ¼" drive)
9. 5324	Socket—12 point (⅝" op., ½" drive)
10. 5322	Socket—12 point (1¹⁵⁄₁₆" op., ½" drive)
11. 2359	Handle and gage (¼" drive, ¼" gage)
12. 2354	Servo Gage—Front
13. 2355	Servo Gage—Rear
14. 2360	Manual
15. 2361	Chart

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With approximately 400 exhibiting manufacturers of equipment, parts and supplies—along with supporting idea-packed conventions of NSPA and MEWA—the service industry will obtain far-reaching benefits from the 10th annual, and biggest . . .

Pacific automotive show

• THE PERIOD OF February 16th through the 23rd, 1958 marks the greatest span of concentrated sales promotion for every segment of the automotive service business.

It marks the staging of the 10th anniversary of the Pacific Automotive Show at the Pan Pacific Auditorium in Los Angeles, where nearly 400 equipment makers, parts suppliers and kindred concerns will display their countless offerings covering virtually everything pertaining to motor vehicle maintenance and repair.

It marks also the 1958 National Convention of the National Standard Parts Association at the Ambassador Hotel as well as the 1958 National Convention of the Motor and Equipment Wholesalers Association at the Statler Hotel.

This Pacific Automotive Show promises to be the biggest Pacific show held to date and appropriately enough NSPA uses as its slogan-theme "It Can Be Great In '58," while MEWA's show convention formula is "Blueprint For Progress."

MANY NEW PRODUCTS, PROCESSES

Aside from the spectacular aspect of so gigantic an affair as the Pacific Automotive Show there is the golden opportunity of assimilating the hundreds of new products and processes over which manufacturers have toiled and sweated in their development and perfection to make service work easier, more precise and profitable.

The meaning of this is readily apparent in this day of manpower shortage in automotive shops. In one fell stroke the show is the meeting place of manufacturers, wholesalers and shop personnel—the great triumvirate on whose shoulders falls the work of maintaining America's motor vehicles at peak efficiency.

A full comprehension of the products of exihibiting manufacturers, and even more specifically, putting them into actual service use, can be a big step forward to "make it great for '58." This is particularly true if the trade puts into practice the timely and constructive things brought into focus by speakers at the NSPA and MEWA conventions.

Commenting on the 1958 theme which strikes the key-note for the convention, Edward Gammie NSPA, president and vice president in charge of sales for Victor Manufacturing and Gasket Co., Chicago, Ill., said: "There is every indication that with more vehicles registered—more of them in the two to six year prime service market age bracket — and greater number of miles being driven, sales for the independent automotive service industry can be great in '58. However, such sales volume increases will not be realized through the simple process of order taking and relaxed sales management. Every firm in our industry must recognize that when it comes to individual sales and merchandising efforts, you have to 'do-it-yourself.'"

All speakers, according to Marty Bazner, Sr., convention program committee chairman, and vice president of Ammco Tools, Inc., North Chicago, Ill., will be charged with responsibility of telling NSPA members and guests how "It Can Be Great In '58" by following through on the practical advice and business management suggestions to be obtained at the NSPA convention.

SPEAKERS AND SUBJECTS

The tentative list of speakers and subjects scheduled for NSPA's convention follows:

"Do - It - Yourself" — J. H. Mehan,

In connection with the show, Goodwin J. Knight, Governor of California issued a proclamation setting aside the week of February 16-23, 1958, as automotive week for California. Left to right: Henry A. Sorenson, president, Independent Garage Owners of California, Inc.; P. Ted Johnston, president, 1958 Pacific Automotive Show; Goodwin J. Knight, Governor of California; J. Leonard Gibson, executive manager 1958 Pacific Automotive Show; and A. E. Zimmerman, president, California Automotive Wholesalers Association.

Manager, Distributors Institute, Chicago, Ill.

"Increasing Gross Profits on Pick-Up Sales" — (Wholesaler Panel) — W. D. Henderson (Moderator), Henderson Brothers, Sacramento, Calif.

"What Is Warehouse Distribution?" —Thomas S. Perry, Thomas S. Perry Company, Inc., Atlanta, Ga.

"Dishonesty of Employees—A National Disgrace" — Arthur E. Shapiro, Vice Pres., Ridgeway Audit Incorporated, Redwood City, Calif.

"Are You Sitting on Your Ideas"— G. Herbert True, Marketing Department, University of Notre Dame, South Bend, Ind. Special presentation at First NSPA "Convention Highlight" Luncheon on February 18.

"Shake the Grate in '58—With Publicity" — Herman Teetor, Director of Advertising Perfect Circle Corp., Hagerstown, Ind.

"Where Is the Automotive Service Work Being Done?" — Russ W. Case, Chilton Co., Philadelphia, Pa.

"What I Expect But Don't Get From the Jobber" — Gail H. Crawford, Executive Vice Pres. and General Manager, Ringsby Truck Lines., Inc., Denver, Colo.

"The Automotive Outlook"—George Romney, President, American Motors Corp., Detroit, Mich.

"Legally Speaking" — Harold T. Halfpenny, NSPA Legal Counsel, Halfpenny & Hahn, Chicago, Ill.

"Unification" — John Reynolds, Chairman of NSPA Unification Committee, Straus-Frank Co., Houston, Texas.

"Training Retailers to Sell"—Frank F. Schuhle, Advertising Supervisor, Miniature Lamp Dept., General Electric Co., Nela Park, Cleveland, Ohio.

"In the Looking Glass"— Mel Turner, Curriculum Director NSPA Vocational Education Program, Mel Turner & Son, Chicago, Ill.

U. S. Senator Barry Goldwater (R-Ariz.), Senate Small Business Committee and Select Committee on Improper Activities in the Labor or Management Field will be the feature speaker at the Second NSPA "Convention High-Light" Luncheon on February 19.

NSPA Convention Program Committee Members: Marty Bazner, Sr. (Chairman), Ammco Tools, Inc., North Chicago, Ill., (Center Front). Seated around the table left to right: Elmer Oleson, Jr., NSPA Staff; Leonard Stout, NSPA Staff; Wm. "Bill" Hedges, Bill Hedges Auto Parts, Portsmouth, Ohio; Frank A. Brusek, Motor & Axle Parts Service, Chicago, Ill.; S. J. Mack, M & L Motor Supply Co., St. Paul, Minn.; Russ W. Case, Jr., Chilton Company, Philadelphia, Penna.; Howard McMurchie, NSPA Staff; Ray Barnett, Irving-Cloud Publishing Co., Chicago, Ill.; Harold Johnson, Sidles Co., Omaha, Nebr.; Vern Olcott, Jr., Red's Motor Parts, Allegan, Mich.; D. D. Minshall, Gates Rubber Co., Denver, Colo.; Norman Parker, H. M. Parker & Son, Glendale, Calif.; Herman Teetor, Perfect Circle Corp., Hagerstown, Ind., J. L. Wiggins, NSPA Executive Vice President. Not present at time picture was taken: Les A. Thayer, Belden Mfg. Co., Chicago.

"IT CAN BE GREAT IN '58"

The full impact of all the show's idea-packed convention sessions is sure to be felt this year and even for a longer time if data recently brought to light by NSPA in the development of its "It Can Be Great In '58" slogan is a criterion. The data indicated that an estimated 67,204,000 vehicles will be serviced—3.1% more than in 1957; 786,000 more vehicles will be in the 2-6 year prime service market age bracket—3.15% more than in '57; 52,066,299,000 gallons of gasoline and diesel fuel will be consumed in these units—5.47% more than in '57 to accelerate all service requirements.

"BLUEPRINT FOR PROGRESS"

The more than a score of timely industry topics to be spotlighted at the '58 MEWA Convention are each designed as "integral parts of the 'Blueprint For Progress'."

According to B. W. Ruark, MEWA general manager, the component topic parts of the "blueprint" will evolve around cogent management procedures and direction, aimed at providing the necessary "momentum for progress and expansion in all major departments of automotive wholesaling." The "blueprint," he added, will be outlined by some 25 industry, association and business "architects" nationally prominent in the important fields of management development and direction, sales, finance, legislation, merchandising, purchasing, labor, advertising, and others.

Ruark disclosed that special attention will be given to trade practices and policies, including those of some manufacturers who also distribute through car factories, major oil concerns and rubber companies . . . and

(*Continued on page 70*)

By FRANK E. LEE

Make use of color in your shop

The selection of the correct tints and shades, both from a functional and attractiveness standpoint, creates a dynamic, powerful production and selling medium in all businesses where automotive service is done

Part II—Selection and application of color patterns

• THE SELECTION OF COLORS for the automotive shop could be based, to a large degree, on the lightness and light-reflecting factors of various colors. The importance of these two factors is based, primarily, on the purpose of the shop—to provide a well-lighted workroom where precision mechanical repairs and adjustments on mechanical parts can be made.

Natural sunlight and the best artificial lighting, without proper reflecting surfaces, do not provide satisfactory illumination for an automotive shop. A secondary source of illumination which must be provided is the diffusion and reflection of light from walls, ceilings, floors, and lighting fixtures. The difference between a diffused reflection and a glare should be kept in mind when considering this point.

USE OF LIGHT COLORS HAS DRAWBACKS

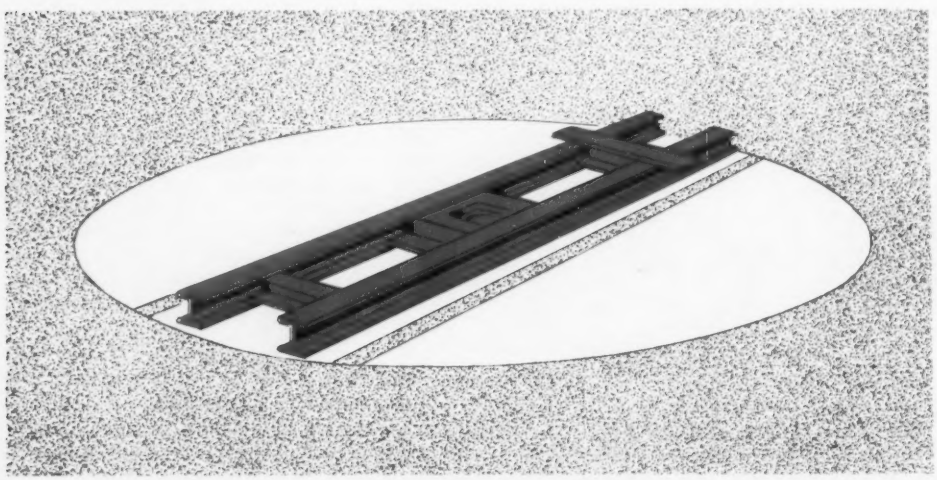
White and light tinted interior surfaces reflect the most light, whether natural or artificial. From this it would appear that the more light colors in the shop the better. To a degree this is true. However, the use of a single good light color has many drawbacks. It's like eating only one good kind of food three times a day, month in and month out—soon it would become monotonous and annoying.

Inasmuch as the shop finish must provide a good reflecting surface, the light reflection values for various colors of industrial finishes suitable for use in the automotive shop are as follows:

Color	Per Cent Range of Reflected Light
White (New finish)	80-89%
White (Old finish)	75-85%
Cream	62-80%
Ivory	73-78%
Green	48-75%
Yellow	61-75%
Buff	49-66%
Blue	34-61%
Pink	36-61%
Gray	14-63%
Tan	30-56%
Red	13-30%
Dark Green	11-25%

The 98% reflectivity of magnesium carbonate, an exceptionally white substance, was used as the standard from which the amount of light reflected from the above colors was established.

As a matter of interest, only 11 basic colors are included in the above list. However, the wide range in the reflected light from most of the colors indicates that each of the colors has many tints, hues, or shades. Thus,



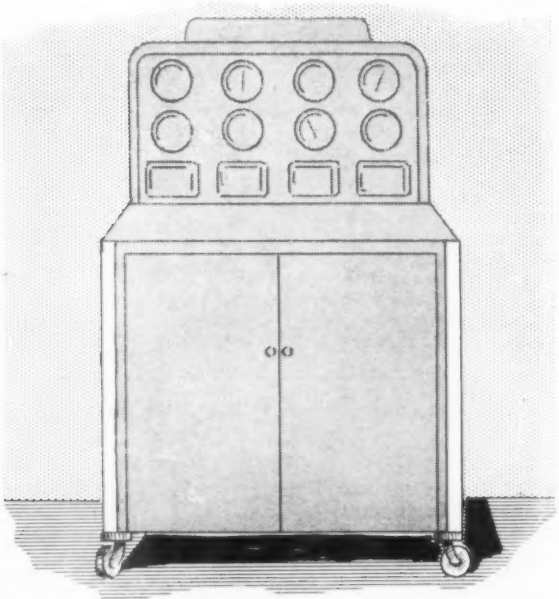
A circular area painted white under equipment such as a lift helps materially in reflecting light under the car being worked upon.

the table covers an exceptionally wide range of colors. This, in itself, could make the selection of a suitable color combination for the shop rather difficult indeed.

To assist in the problem of selecting the correct colors for the automotive shop, many paint manufacturers have developed a number of pre-tested color combinations for this particular purpose. As a general rule, the most satisfactory results will be achieved if the color combination is selected from one of the recommended patterns. There are many practical reasons why this is so.

As a typical example, to visualize how certain colors will look when applied to a large area often is very difficult. For similar reasons making a color selection from small color chips may be rather unreliable. Once the various colors are applied to their respective surfaces the over-all effect may be quite different from that which was expected. In view of these possibilities, there are many advantages to using color combinations that have been carefully planned in advance. In many instances, no matter which pattern is selected, it can be relied upon to have good color harmony and to be in good taste.

A typical group of pre-tested color combinations recommended for use in the automotive shop are included to emphasize the importance of considering the whole establishment when selecting the color pattern. The

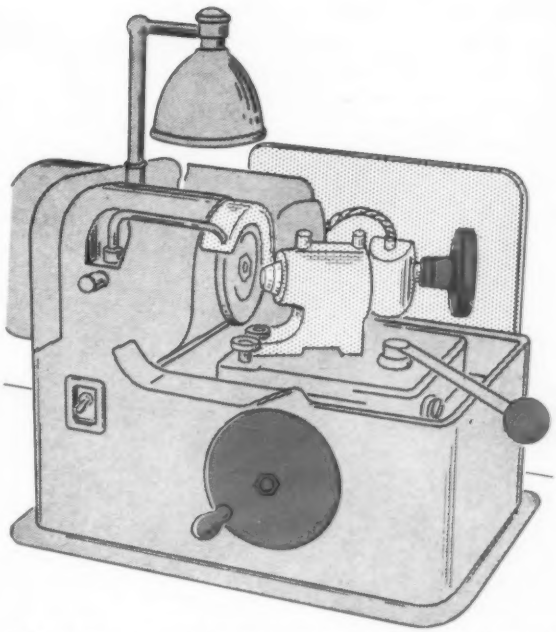


An accent color on the forward corners of equipment helps to bring out the third dimension effect to emphasize bump-against corners.

order in which the various color patterns are presented has no significance and is not intended as an indication of preference for a particular color pattern. All of these patterns are good. In fact, each one includes a number of alternate suggestions for complete color conditioning of the service shop.

COLOR PATTERN NO. 1

This color combination of ivory and brown will provide good over-all illumination in the shop. Use medium green or medium blue for the shop equipment if a striking contrast is desired. Use silver gray or brown for the equipment when less emphasis or less contrast is the objective.



A silhouette color used for the immediate background of critical seeing areas and accent color on controls promotes better work and induces safety.

Major color surfaces.
Wall—ivory.
Dado—brown.
Ceiling—white or ivory.

Minor color surfaces:

(A) Equipment—medium green.
Silhouette—ivory or pale green.
Accent—yellow or red.
Floor—light gray or medium red.
Zone mark—yellow.

(B) Equipment—silver gray.
Silhouette—ivory.
Accent—red.
Dado stripe—dark red.
Floor—medium gray or tile red.
Zone mark—yellow.

(C) Equipment—brown.
Silhouette—ivory.
Accent—orange.
Dado stripe—coral red.
Floor—light gray or medium red.
Zone mark—white.

(D) Equipment—medium blue.
Silhouette—ivory or light blue.
Accent—yellow.
Dado stripe—dark red.
Floor—light gray.
Zone mark—yellow.

COLOR PATTERN NO. 2

Here is a pleasing combination of soft, light green colors. The general effect will be cool, refreshing. The field of vision will be restful for the eyes. Medium green used for the equipment will carry the soft green throughout the shop.

Brown and medium blue provide good equipment color contrast on either side of green on the color scale. With silver gray as the equipment color this pattern is

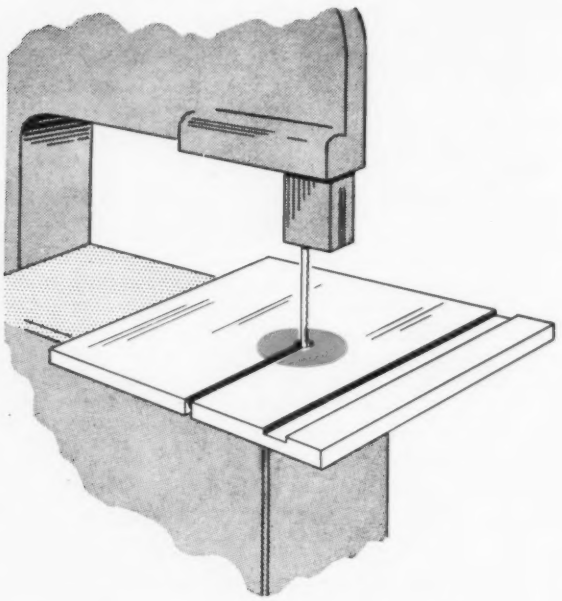
(Continued on following page)

Color in the Shop . . . CONTINUED

one of the most practical and popular combinations of color for the typical automotive shop.

Major color surfaces:
Wall—light green.
Dado—sage green.
Ceiling—white or light green tint.

Minor color surfaces:
(A) Equipment—silver gray.
Silhouette—ivory.
Accent—red.
Dado stripe—dark green.
Floor—medium gray or tile green.
Zone mark—white.



Bright red or brilliant orange helps to mark hazardous cutting edges of shop equipment. Machined surfaces are, of course, never painted.

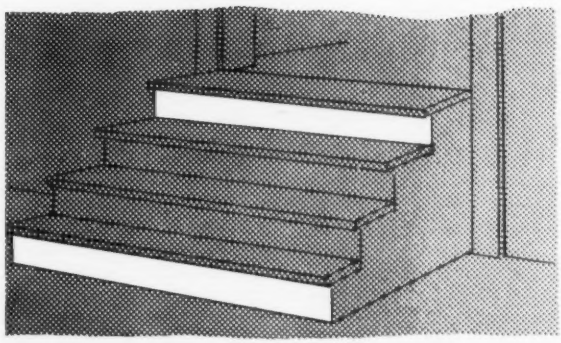
(B) Equipment—sage green.
Silhouette—ivory or light green.
Accent—yellow or red.
Dado stripe—dark green.
Floor—medium gray or tile green.
Zone mark—white.

(C) Equipment—brown.
Silhouette—ivory.
Accent—orange.
Dado stripe—dark green.
Floor—graystone or tile green.
Zone mark—white.

COLOR PATTERN NO. 3

Use the cool tones of refreshing turquoise—a pleasing combination of blue and green—to create a cheerful, airy atmosphere without being too exciting. White is generally used for the ceiling because it lends a sparkling accent to the turquoise walls. When silver gray is selected for the shop equipment this is one of the most attractive color patterns for the automotive shop.

Major color surfaces:
Wall—turquoise.



For safety sake the top and bottom risers of steps should be painted a bright color, like high-visibility yellow.

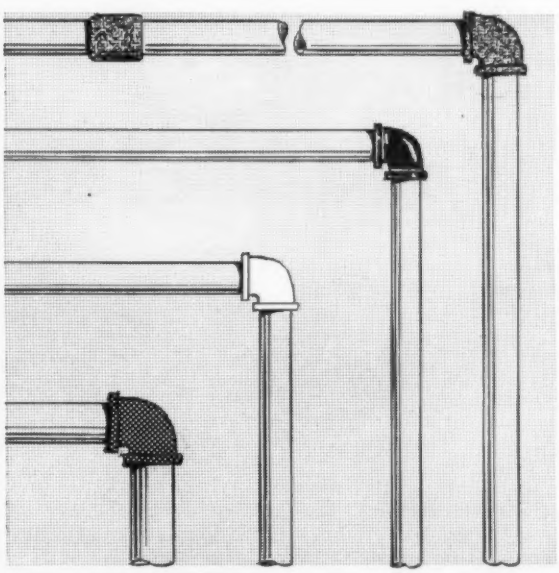
Dado—medium turquoise.
Ceiling—white or turquoise tint.

Minor color surfaces:
(A) Equipment—silver gray.
Silhouette—ivory.
Accent—red.
Dado stripe—dark turquoise.
Floor—medium gray.
Zone mark—white.

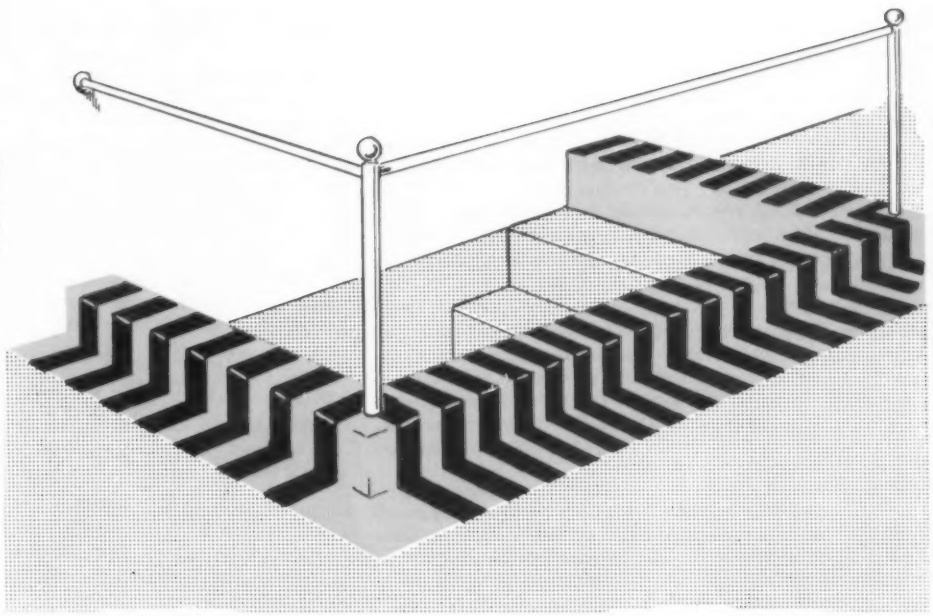
(B) Equipment—medium turquoise.
Silhouette—ivory.
Accent—yellow or red.
Dado stripe—dark turquoise.
Floor—medium gray or tile red.
Zone mark—white.

COLOR PATTERN NO. 4

A neutral background provides a wide selection of color if the mechanics wear colored uniforms or coveralls. This color pattern is one of the most neutral of the pre-tested color combinations. If the mechanics wear gray or some other neutral color uniforms or coveralls



Pipelines can be painted the same color as the wall or ceiling. Identification colors should be painted at intervals, such as elbows, couplings, valves, etc.



A non-moving hazard as a descending stairway can be emphasized with a stripped effect, such as orange and black.

this color pattern is not specifically recommended. Another color pattern would do more for the appearance and atmosphere of the shop.

Major color surfaces:
Wall—ivory.
Dado—silver gray.
Ceiling—white or ivory.

Minor color surfaces:
(A) Equipment—brown.
Silhouette—ivory.
Accent—orange.
Dado stripe—coral red.
Floor—light gray or medium red.
Zone mark—white.

(B) Equipment—silver gray.
Silhouette—ivory.
Accent—red.
Dado stripe—dark red.
Floor—medium red or light gray.
Zone mark—white.

USE OF COLOR ON SHOP EQUIPMENT

An important part of selecting the most suitable color pattern for the shop is the selection of the proper colors for the equipment. Equipment in the shop is like furniture in the home. Equipment transforms a large room into functional work areas. Equipment lends interest to the shop by breaking up long walls and broad floor areas. Thus, the whole character of the shop interior hinges upon the colors used on the equipment.

The effect of the mass or bulk of the various units was considered in drawing up the various recommended color patterns. Colors to be used in silhouette or accent areas were also included. The area on which the silhouette color is applied is that portion of a machine that provides the immediate visual background. This area can best be determined by looking at a piece of equipment from the typical working position. For example, on a lathe the unmachined portions of the lathe bed, the head stock and the tail stock are very often in the direct field of vision. On a valve grinder, portions of the machine base, the tool holder, wheel guard, and similar parts usually are in the immediate field of vision. The jaws of the vises on the work bench are another good place to use the silhouette technique.

The purpose of the silhouette area, again, is to direct and hold the mechanic's attention on the critical working area. If the silhouette color is used on too large an area the effect is about the same as if a silhouette area had not been provided.

Accent color is used on hand wheels and controls to make them stand out immediately when a mechanic looks at or reaches toward them. An accent color should also be used on particularly hazardous parts of a machine, such as a cutter blade, V-belt drive, etc.

The purpose of the accent color is to help the eye more quickly see a particular part. Tests have proven that, even though a worker is thoroughly experienced on a given machine or piece of equipment, he usually will glance momentarily toward a control button or handle before his hand reaches toward the object. The accent color makes the part stand out, thus the seeing effort is reduced. The accent color also helps bring out the third dimension effect in seeing that is needed for

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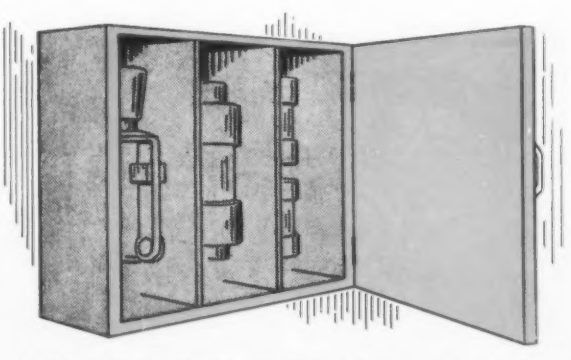


A light color, as brilliant orange on the cover and edges on a switch or fuse box promotes caution.

Color in the Shop . . . CONTINUED

the safe, efficient operation of shop equipment.

Some of the other places where the accent color can be used to advantage are:

- Oil cups and other lubrication points to emphasize the need to keep shop equipment properly oiled.
- Wheel balancer controls painted with the accent color will make these parts stand out when the unit is in use.
- Controls of electric chain hoists, overhead doors, floor lifts, and similar equipment.

Certain pieces of equipment often are used or are located where they could create traffic hazards in the shop. In this group are such items as hand jacks, floor jacks, hoist platforms, creepers, and wheel aligners. Equipment in this category can be painted in a brilliant orange to make them stand out and easier to see. If a piece of equipment is easier to see there is less chance that it will go unnoticed in a traffic aisle in the shop. This will protect persons walking through the shop and the mechanic using the equipment.

The use of a brilliant orange on small pieces of equipment acts as a safety reminder without adding too much of this vivid color to upset the basic shop color pattern. If too much of the color is used or if it is used indiscriminately on large pieces of equipment, it is bound to lose its advantage as a safety reminder.

High visibility yellow can be used to accent the corners of wheel mounted test equipment, tool trucks, tool toters, or tool carts. These pieces of shop equipment are generally quite large, and as a result the spots of easy-to-see yellow will emphasize the corners or edges that a person might bump while walking through the shop.

Any piece of shop equipment can be refinished by following this general pattern.

- Use the selected equipment color on non-critical surfaces.
- Silhouette the immediate visual background of the working area.
- Emphasize controls and critical areas in the recommended accent color.
- Highlight corners of wheel mounted test units and similar equipment. An excellent choice for this purpose is high-visibility yellow.

COLOR FOR SAFETY

The intelligent use of color for safety has gained widespread recognition as an important element in the automotive service shop. Actually the use of a pre-tested color pattern on the walls, ceilings, floors, and shop equipment, has many safety advantages. In addition, color can be used as a direct safety factor.

Color is ideally suited as a spotlight supplement to direct a person's attention to potential accident hazards. It can also be used to identify the type and location of shop safety equipment.

Colors used for safety purpose should attract a person's attention and immediately call to mind previously established associations. For example, red traditionally identifies fire protection equipment and green is widely recognized as a safety color.

"WHEN I MENTIONED STOCKINGS, SHE UNDERSTOOD!"
NO MATTER HOW MANY TIMES I HAVE THE CAR WASHED, THE FRONT WHEEL WHITE WALLS LOOK GREASY!
YOU CAME JUST IN TIME, MISS. GREASE ON WHITE WALLS CAN BE A SYMPTOM OF LEAKING OIL SEALS
OIL SEALS?
OIL SEALS
ALL THIS MAY BE TRUE. BUT CAN YOU STOP MY FRONT WHEEL WHITE WALLS FROM GETTING DIRTY?
SURE! I'VE GOT REPLACEMENT OIL SEALS FOR EVERY MAKE CAR AND LIGHT TRUCK— ALL IN THIS C/R CABINET — BEST FOR STOCKING OIL SEALS.
INSPECT... PROTECT FRONT WHEEL BEARINGS Every 5,000 Miles
STOCKINGS, I UNDERSTAND
THIS C/R OIL SEAL FITS RIGHT, SEALS TIGHT JUST LIKE THE FACTORY ORIGINAL
FACTORY ORIGINAL?

Once a color is adopted in the automotive shop for a specific safety purpose it should be used only for that purpose. The widespread use of a safety color for other purposes will defeat the purpose of a recognized color code for safety.

Another good idea is to select safety colors that are widely used in other automotive shops and in most other industries as well. Specific colors for safety were adopted as a safety color code in 1944 by the American Standards Association and now are used almost universally. The code and meaning of each color is as follows:

YELLOW—Watch out for moving objects.

Yellow, a color with high visibility, should be used as a broad stripe when marking busy aisles, moving overhead objects, bump-against corners of wheel-mounted equipment, and similar hazards. When used with black to form a striped or parallel bar pattern, it identifies non-moving objects that create hazards of stumbling over, falling into, or striking against.

ORANGE—On guard for objects that are a hazard—even to touch.

Orange is another high visibility color. Crushing or cutting edges should be identified by an orange stripe. The interior of electrical switchbox doors and emergency switches on machines should be painted a brilliant orange. Machine guards or moving parts that may extend near an aisle should be tipped or banded with orange.

RED—Fire protection.

Red is the color associated with fire and should be used to identify the location of fire-fighting equipment. Use the color on the equipment or paint a large square or circle on the surface behind the equipment. On columns paint a band near the ceiling and floor as well as at the extinguisher location. A 12-inch band can also be painted on the floor around the column.

BLUE—Equipment out-of-order.

Blue is the caution color. Blue flags or blue alert tags should be used to warn against moving equipment on which maintenance work is being done. Blue discs can also be hung over machine controls when a machine is out of service for repairs. The discs, flags, or tags, used for these purposes can be lettered to explain the reason for the caution warning. For example, out-of-order, do not move, and similar appropriate cautions.

GREEN—The first aid and safety equipment color.

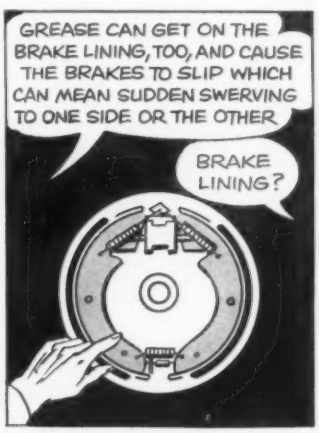
Green is associated with safety and medical practice and should be used to identify safety equipment and its location. A white cross on a green background identifies cabinets containing first aid supplies.

WHITE—For good housekeeping.

White is the clean color. Storage areas for large parts or equipment should be marked with solid white strips to make the most effective use of available floor space. Always be sure that traffic aisles and fire equipment locations are left open and unobstructed.

(Continued on following page)

YOU SEE, WHEN THE SEAL IS WORN IT LETS GREASE OUT AND DIRT IN. BEARINGS MAY GO DRY—AND WITHOUT LUBRICATION, THERE'S DANGER OF "SEIZING" OR "FREEZING".
FREEZING?


GREASE CAN GET ON THE BRAKE LINING, TOO, AND CAUSE THE BRAKES TO SLIP WHICH CAN MEAN SUDDEN SWERVING TO ONE SIDE OR THE OTHER.
BRAKE LINING?

SEE HOW YOUR SEAL IS WORN...HOW LOOSE IT IS. THIS SHOWS UP ON THE FRONT WHEEL.
INSTALLATION TOOL FROM OUR CHICAGO RAWHIDE KIT
RAWHIDE?

Free FOLDER

Tells how you can make more money with C/R Oil Seals. Explains Big Bonus Oil Seal offer and new C/R front wheel installation tool kit. WRITE FOR FREE COPY TODAY!

...and remember **ALWAYS REPLACE—NEVER REUSE OIL SEALS!**

C/R
CHICAGO RAWHIDE
SERVICE SALES DIVISION
ELGIN, ILLINOIS

Color in the Shop . . . CONTINUED

White can also be used under waste or trash cans as a reminder that waste material belongs in (not just near) the can. Another good place for white is at floor and wall corners in stairways and in passageways. The spot of white discourages tossing waste or scraps into these convenient spots.

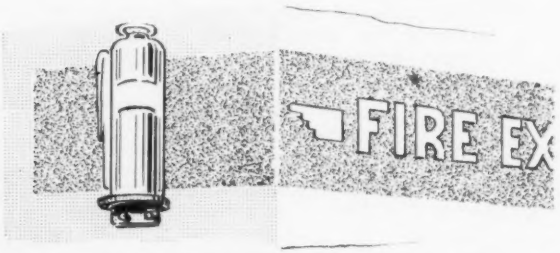
IDENTIFICATION OF PIPE LINES

The various pipe lines in the automotive shop can be identified with individual colors. This procedure is a big help whenever maintenance work on one of the lines is necessary.

A suggested group of colors for pipe line identification is as follows:

Color	Pipe line
Red	Sprinkler systems
Green	Cold water
Yellow	Hot water
Black	Compressed air
Purple	Lubricant lines

The pipe line runs should be painted in the wall or ceiling color, whichever provides the immediate background for the pipes. The identification color should be used on valves, flanges, couplings, or in bands around the pipe at appropriate intervals along the run. Also, place an identification band around pipes entering or leaving a wall or ceiling.



A light color, as brilliant orange on the cover and edges on a switch or fuse box promotes caution.

The objective in pipe line identification is to apply only enough spots of color to readily identify the various lines if maintenance work is required.

FLOOR COLORS

The floor area of the automotive shop can be considered as a traffic zone. Within this traffic zone are smaller functional zones or subdivisions as follows:

1. The traffic lanes used by vehicles entering and leaving the shop, by mobile shop equipment, and by mechanics moving about on foot.
2. The spaces where mobile shop equipment, accessories, large parts, and supplies are stored.
3. The spaces where service operations take place.
4. The area where vehicles being serviced are stored or parked overnight.

The various traffic zones should be adequately marked for safety. A good way to mark these areas is to make a boundary line for the various areas with the zone mark color. This method of floor marking does not introduce large patches of gaudy colors into the floor area as would result if the floors in individual traffic zones were painted separate or distinctive colors.

Lighter floor colors improve the lighting of the underside of vehicles being serviced. This is a good point to keep in mind when selecting the color to be used on the floor around the floor lift. White is recommended for this location because of its high reflectivity.

Floors in service or storage areas can be used to full capacity by marking off the space assigned to each parking space or to each service area.

Here are the color surfaces covered by most manufacturers' color recommendations:

—Wall

—Dado
(Lower three or four feet of wall surfaces.)

—Dado stripe
Narrow stripe one or two inches in width immediately above the dado.

—Ceiling

—Floor

—Equipment
The basic machine color.

—Silhouette
Machine area that provides the immediate visual background for precision work operation such as with a lathe or grinder.

—Accent
Key machine areas or controls of equipment used continually by mechanics.

—Zone mark
All floor marking used to separate or identify various shop work centers or areas.

COLOR IN THE REST ROOM

It is a good idea to finish rest rooms in colors that offer a pleasing contrast to the color pattern used in the shop. The contrast in colors provides opportunities for visual refreshment and relaxation as a person moves between the shop and rest room areas during the course of a working day.

Rest rooms that are bright, fresh, and clean help build shop morale and are important to the well-being and health of everyone in the shop.

When planning the use of color in the shop, consider the shop as a whole. Valuable information is also available by contacting any one of a number of paint manufacturers or their distributors.

In conclusion, it is important to keep the idea in mind that color can be used in the shop as an important working tool. A correct color pattern will improve see-ability throughout the shop. As a result, the colors used can have a direct bearing on the quality as well as the amount of work the shop can turn out in a certain period of time.

The splendid assistance in the preparation of these articles given by the following manufacturers is gratefully acknowledged: Sherwin-Williams Co., Pittsburgh Plate Glass Co., The Glidden Co., and The Valspar Co.

WHEN CHANGING YOUR ADDRESS

Please notify us 5 weeks in advance. Supply us with both your old and new address, including address label from current issue if possible. Copies we mail to your old address will not be delivered by the Post Office unless you pay them extra postage. **Mail address changes to Circulation Dept. Automotive Service Digest, 900 South Wabash Ave., Chicago 5, Ill.**

"Level Air" Compressor Check Valve Relocated for Greater Efficiency

Chevrolet advises that the air suspension compressor outlet check valve, located between the compressor outlet and the pressure discharge hose (steel braid), has been relocated to prevent valve failure due to heat. Failure of the check valve, according to Chevrolet, can cause back pressure in the compressor, thereby greatly reducing compressor efficiency.

The new valve is located between the pressure discharge hose (steel braid) and the accumulator tank Schrader Valve body. Vehicles built with check valve located at the compressor end of the discharge hose should be modified to incorporate the later design valve, in the following manner.

1. Remove and discard the existing check valve and metal gaskets at both ends of the valve.
2. Connect the discharge hose directly to the compressor outlet.
3. Install new design check valve (Part No. 3754500) between accumulator tank Schrader Valve body and discharge hose, using one gasket (Part No. 3746199) at each end of valve.

Caution: The early design check valve *will not function* if installed at the accumulator end of the discharge hose.

English Ford Line's Latest

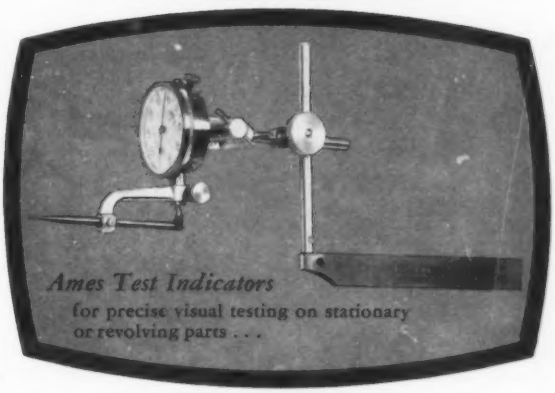
The newest addition to the English Ford line is this ¾-ton Thames "800" Van. With a short-stroke overhead valve engine developing 59 brake horsepower at 4,200 r.p.m., the van offers maximum payload space of 180 cu.ft. It is available in a variety of solid and two-tone color combinations and can also be ordered in cab and chassis version, thus permitting a variety of special bodies.

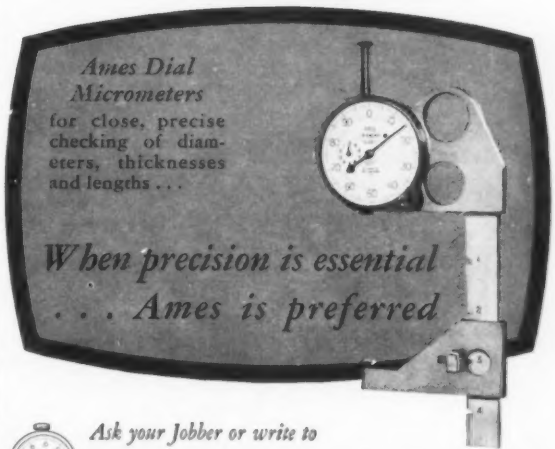
Correcting Leaky Tail Gate On Studebaker Wagons

Where water leaks are found in the area of the tail gate at the belt moulding location on 1958 Studebaker 4-door station wagons, it is very likely to be occurring through an opening at the seam between the two body panels at the belt moulding location. When this is found, the factory suggests the following correction be made.

Remove the belt moulding and clip at the extreme rear of the moulding. Carefully seal the seam between the two body panels with eyebrow sealer. There is, also, an unused moulding clip hole under the moulding, and this hole should be sealed with dum-dum. Re-fasten the moulding properly and paint the sealer with the proper color touch-up paint.

AMES

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By STOKES TAX CONTROLS, INC.

Tax guide and business briefs

√ The furor over expenses for travel and entertainment

● THERE HAS BEEN much publicity about the new Treasury attack on Travel and Entertainment. Business men, large and small, must know now where they stand in 1958 and the protective measures to be taken.

For many years, the entertainment account has been the means of obtaining new business and rewarding past favors. Where the owner of the business does the entertaining, the duty is not always unpleasant. In providing entertainment facilities at clubs, etc., many fringe benefits accrue to the owner and his family.

AN IMPORTANT FRINGE BENEFIT

During the last 20 years of high taxes, the entertainment account has become an important fringe benefit along with liberal travel allowances. Liberalized Travel and Entertainment was a loop-hole in the Wage Stabilization Law when salaries were frozen. Executives have been hired with the understanding that they will have liberal tax-free expense accounts. Many friends get treated to luxurious meals on the expense account. The automotive industry was quick to get into the program and entertainment of large customers, manufacturers' representatives, etc., has been heavy. Since automotive merchants are primarily salesmen, they go where the customers are and the business is charged with club dues and all the other extras. This is good business judgment and the tax benefits are only incidental.

However, the Internal Revenue cannot forget that the boss gets fed, and entertained, and exercised, and it is all fun, whether it is or not. Also, they argue that the business friends who are entertained are the same social friends who would be entertained any way.

Long ago, it became clear that travel and entertainment would not be a tax deduction unless the evidence showed (a) that the money was spent and (b) that it was spent for bona fide business purposes. Some years ago, it was ruled that taxpayers who receive a fixed allowance for travel and entertainment must add the allowance to compensation and deduct the actual expenditures, supported by proper detail. This requirement was later eliminated if the employee accounted in detail for expenses to his employer.

A T & E Committee was organized in each Internal Revenue Office to analyze tax returns and establish a policy for examiners. Apparently, the goal was to disallow some Travel & Entertainment Expense on every audit. The next Treasury brain-storm required that any Travel and Entertainment disallowed on a corporation or partnership return should be added to the personal income of the owner. That is the rule in all Internal Revenue Offices at present.

COMMUTATION EXPENSES

The Courts have held that commutation expense from home to office is personal expense. Some bright one decided that the executive who comes to work in a company-owned car should be charged for the personal use of the car by adding an arbitrary amount to his personal income and that practice is quite common now amongst Internal Revenue Agents. Lately, some Internal Revenue Agents have threatened to tax the personal use of company-owned automobiles by all employees. This seems a petty refinement which will cost more to enforce than the revenue involved.

Another loop-hole was recently closed by requiring Internal Revenue Agents auditing a business to audit the personal returns of the owners.

Now the government is reaching towards all employees who have expense accounts. There are not enough personnel to audit all personal returns. If returns with potential travel and entertainment disallowances could be specially marked on Page 1, Internal Revenue could separate such returns for thorough check. This idea was injected in the 1957 tax forms.

THAT CONTROVERSIAL LINE 6(a)

The 1957 U.S. Income Tax Returns for individuals (Form 1040) require that *all* reimbursed expenses other than business travel and transportation shall be added to gross income and deducted on another line with complete supporting detail.

The newspapers gave wide publicity to this new requirement and this apparently disturbed Internal Revenue who then announced that the new requirement did not represent a change in policy because taxpayers were always required to keep accurate and detailed Travel and Entertainment records. No more detailed records were required in 1957 than in earlier years. They also said the new line was inserted to facilitate detection of abuses of expense accounts. A short time later, they announced that taxpayers will *not* have to fill in Line 6(a) for 1957 because of the delayed announcement of the new requirement. Internal Revenue also stated that taxpayers will be expected to keep "adequate" records for 1958. One thing is certain; the business and individual returns of owner-managers will get a thorough check during 1958.

RECORD KEEPING WILL PAY OFF

Business men are constitutionally opposed to cluttering their minds with record-keeping but they are going to find it expensive not to do so. Audit of Travel and Entertainment accounts need not be disturbing if the following points are covered:

- In the case of charge accounts, obtain and keep the individual vouchers and mark on each the persons entertained.
- Keep those receipts normally obtained such as hotel bills, plane tickets, theatre stubs, etc. Note reason for the expenditure on each.
- Keep a list of cash expenditures such as parking lots, tolls, taxis, tips, bar bills, meals, etc., showing date, amount and reason for expenditure.

- Avoid cash expenditures if possible.
- Keep a record of gifts charged to Travel and Entertainment and keep the "thank you" notes.
- If you draw a round amount for a trip, return the unexpended portion to the business.
- If you take a combined business and pleasure trip, keep a record of what you do *not* charge to the business. The size of your share will influence the allowance of the company share.

NO PRESCRIBED RATIO

The bigger your expense account, the more important it is to keep records. There is no prescribed ratio of Travel and Entertainment to sales which protects you. If you are not willing to disclose the names of persons who receive entertainment and gifts, better figure that such entertainment will cost you double on account of disallowance by the Internal Revenue Agent.

Longer Plugs Needed on Dodge "L" Series Trucks

According to a recent Dodge Truck Service Bulletin, only a longer reach (¾" threaded section) spark plug (AGR41) can be used in the 1958 "L" Series, 315 cu. in., single rocker engine; and it is *not* interchangeable with the ⅜" reach AR41 plug used in the 1957 "K" series.

If the long reach plug (AGR41) should be installed in the "K" engine, half of the plug threads will protrude into the combustion chamber. This will cause overheating and possible pre-ignition and the exposed threads will become corroded, making plug removal extremely difficult.

Using the short reach plug (AR41) in the "L" engine will result in a pocket being formed in the threaded section below the plug. This will affect engine performance and the threads themselves will become filled with deposits requiring a tapping operation to permit the installation of the proper ¾" plug. This is not only a difficult operation, but one that could result in damage to the threads as well as to the cylinder head.

To facilitate plug installation, a decal showing the proper reach plug is posted on the rocker arm cover.

Leaking Water Pump

On some 1957-'58 6-cylinder Ford engines, insufficient gasket pressure may cause coolant leaks between the water pump and the cylinder block. These leaks can be eliminated by using two gaskets, according to the manufacturer.

No Radical Changes Made By Volkswagen for '58

For 1958 the familiar VW body shape and engine have been retained, although the rear window has been enlarged to provide 95% greater glass area, and the windshield has increased vision, bringing a slenderizing of front pillars.

The American woman, and her high heels, have resulted in the addition of a full accelerator pedal to replace the roller-type previously used. Other slight differences are in the arrangement of dashboard control knobs and radio speaker, and the enlarged glove compartment.

The engine remains unchanged except for a modified intake for the engine-cooling air, resulting from redesign of the rear window. Brake application has been made several degrees lighter, although the main hydraulic braking system continues identical to earlier models.

New sedan colors bring the range to black, agave green, coral, glacier blue, light bronze, diamond grey and Capri blue. The Convertible colors are black, alabaster, atlas blue, Inca red, shetland grey and bamboo.

WHY PAY MORE TO REAP TUNE-UP PROFITS?
There's a Complete Line of Hanson Auto Testing Equipment
Compression Tester
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Deluxe Compression Tester
Vacuum-Fuel Pump-Tester
Battery Coil Tester
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DWELL ANGLE-TACHOMETER TESTER
Measures 0 - 1000 and 0 - 5000 RPM . . . reads cam angle directly on 4, 6 and 8 cylinder engines without removing distributor . . . for 6 and 12 volt systems . . . battery operated and portable for road testing.
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Tests both 6 and 12 volt coils showing "good" or "bad" . . . indicates that condenser is "high" or "low". Simple rotating switch completes all tests . . . large 3-color dial is easy-to-read.
Mechanic's Price $37.50
EXHAUST GAS TESTER
Tests combustion efficiency at idle and high speeds . . . indicates fuel air-fuel mixture as rich or lean. For fast, accurate carburetor adjustments. Battery operated and portable for road testing.
Mechanic's Price, less battery..... $46.95
A-V-O GENERATOR REGULATOR TESTER
Reads —10 to +80 amps; 0 - 16 volts; 0 - 50,000 ohms. Tests relays, circuits, equipment . . . locates shorts or broken wires. For both 6 and 12 volt systems. Battery operated and portable for road testing.
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ALL STEEL TESTER STAND ONLY.....$ 62.95
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ALL 25 HANSON MODELS ARE TOP QUALITY, FULLY GUARANTEED AND COME COMPLETE WITH EASY-TO-FOLLOW INSTRUCTIONS.
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Willys Changes Design of Rear Bearing Oil Seal

A recent improvement in all Willys Model 6-226 engines is a change in design of the rear bearing oil seal assembly to reduce the possibility of leakage at rear oil seal.

The change includes preinstalled seals in both the filler block and guard assemblies, and the addition of alignment pins in the filler block with matching holes in the guard.

When attempting to correct a rear bearing oil leak the filler block assembly should be inspected to determine if it has the alignment pins installed. If no alignment pins are present, a complete rear oil seal service kit, (Part Number 917608) should be installed. If the filler block assembly has alignment pins, only the oil seals (731046) and individual parts determined from inspection to be defective or worn, should be replaced.

Maremont Now In It's Own 12-Story Building

Maremont Automotive Products, Inc. last month marked its 80th Anniversary by moving its headquarters to a recently purchased 12-story building located in Chicago's downtown area.

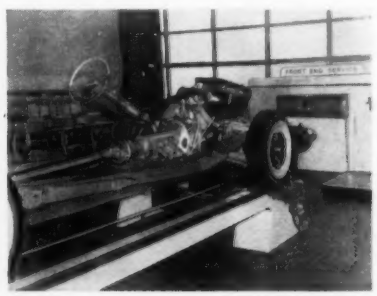
The firm will occupy five floors of the building, located on Chicago's famed Michigan Avenue for its national executive offices.

The building was purchased recently by the company's Employees Profit Sharing Pension Trust and Profit Sharing Pension Plan, and will be renamed "The Maremont Building." Purchase price and cost of improvement is said to be approximately $1,250,000.

Bear Safety School Adds Torsion-Air Suspension

A new Dodge Torsion-Aire suspension chassis was recently added to the various suspension units now in use at the Bear Safety Service School in Rock Island, Ill., according to Victor B. Day, the company's president.

The new chassis is mounted on a Bear Telaliner alinement machine in



This Dodge Torsion-Aire suspension chassis is the newest addition to the Bear Safety Service School.

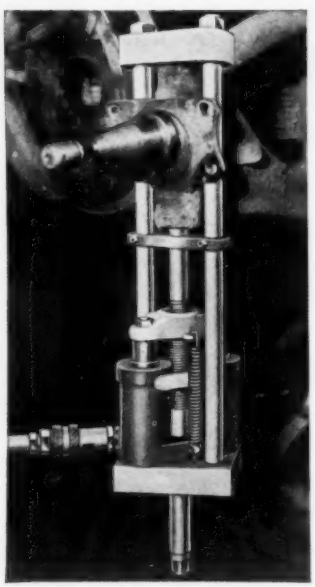
classroom number one at the School where it is used by school instructors in lectures on Theory of Alignment and use of various checking and correcting tools, as well as in demonstrating proper use of the company's Torsion-Aire Height Gauge.

Mr. Day further stated, "We now have alinement and frame machines equipped with complete automotive suspensions for the students to study and practice on at our school. There are also working cut-aways of all the various steering gears and six different power steering units mounted complete with compressors for demonstration and practice. Our plans during the next few months include the addition of several more power steering units and suspensions."

Remember Their "Birthday"

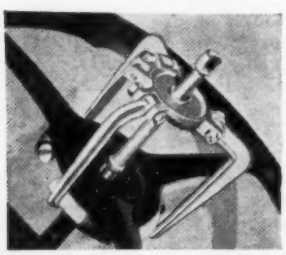
One enterprising dealer uses this approach to recall old customers. On the anniversary date the owner took delivery of his new car or used car he receives a "car birthday" greeting . . . offering a free lube as a "thanks" for past patronage. It brings many old customers back for more than just the needed lubrication.

Kingpins out in 5 Minutes with... OTC Kingpin Pusher



Remove, install kingpins fast without beating, heating, hammering—use this portable hydraulic OTC tool . . . unit develops 17½ tons hydraulic force, makes easy work of toughest kingpin jobs. Front-end work is more profitable, goes through shop fast. Wide range of adapters handles nearly every car, truck, tractor, bus.

The same OTC hydraulic ram works with other OTC hydraulic tools — just add attachments to bend, push, straighten, remove, install. Ram gives straight-line force without binding or torque effects. Pays for itself in time and tools saved on first few jobs.



Steering Wheel Puller

New OTC puller has adjustable legs to pull 2-, 3-, 4-spoke wheels on any American, foreign car or truck. Rubber cushion can't mar wheel, spokes.

SEE YOUR JOBBER OR OTC REPRESENTATIVE

OWATONNA TOOL COMPANY

301 Cedar Street • Owatonna, Minnesota

John H. Victor, Modern Gasket Pioneer, Dies at 75

Founder of the Victor Manufacturing & Gasket Co. in 1909, and chairman of the Chicago firm since 1948, John Harvey Victor passed away suddenly on December 8th in his suburban Wilmette, Ill., home.

Up to the time of his death, Mr. Victor was vigorously active in the business he started in a modest warehouse and built into the world's largest source of automotive and industrial gaskets, oil seals and packings.

From the start, John H. Victor was dedicated to constant betterment of his company's products. He personally invented a number of basic gasket and oil seal designs in use today. He pioneered in the development of the synthetic rubber sealing element in oil seals, now universally used in place of the old element, leather. Shortly before his death, he took a leading role in bringing out the Victocor gasket, a radically new approach to sealing today's high-compression engines.

The history of the Victor Manufacturing & Gasket Co. is truly the lengthening shadow of its founder. Yet, early in his business career, Mr. Victor displayed the knack of sharing the management load with capable executives in all divisions. He leaves the business in good hands, with men similarly dedicated to producing quality sealing products under the leadership of his son, George E. Victor, who has been president since 1948. Another son, William F., is vice president in the firm.

John Harvey Victor

Give It A Tune-Up . . .

(Continued from page 34)

an independent shop, management should see that a complete and honest job is done. If the desire for a "fast buck" — speaking very frankly — is stronger than the desire to give the customers what they pay for, then little by little customers will drift away and go to shops where real tune-up work is done. Car owners are not all suckers, and they do appreciate good workmanship at reasonable prices.

A certain shop in Los Angeles—Offenhouser Engine Analysis—has five men busy continually, with customers waiting for their appointments, because they do a wonderful tune-up job. In fact, they tell their customers, "If you can go anywhere and get your engine to run better than it does when we get through with it, we will give you your money back!"

Would *you* make such a guarantee?

Reversing Check Valve Aids TorqueFlite Action

Chrysler advises that in all production TorqueFlite transmissions after transmission serial number 547,000 (approx.), the front and rear pump check valve has been *reversed* in the regulator body, placing the small bleed orifice against the front pump pressure port. This step has been taken to improve idle and low speed line pressure characteristics.

The service department recommends that when any TorqueFlite transmission prior to the above serial number is removed and disassembled that the pump check valve be reversed. When reassembling, *this valve should have the bleed orifice placed toward the front pump port cavity.* The check valve must not protrude above the regulator body surface and should seat properly on both sides.

If the pump check valve is collapsed, distorted, kinked, or shows signs of improper seating, the pump check valve should be replaced with a new part.

Make Sure Dip Stick Is Right One for Engine

If a 1958 Dodge V-8 engine appears to have too high or too low an oil level, the engine oil dip stick should first be checked to make sure it is the proper dip stick for the engine.

According to the Dodge Service Department, the dip stick for the 350 or 361 cu.in. V-8 engine measures 2⅝" from the bottom of the stick to the "Add Oil" mark and the 325 cu.in. engine stick measures 1⅝" from bottom to "Add Oil" mark.

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New Push Bumper for Trucks

The latest development in Holmes Wrecker Equipment is a new push bumper with grill guards for use with the standard type wrecker.

The husky, new bumper and grills were designed to accomplish two important functions. First, to provide added protection for all wrecker users, especially those with the new type

trucks that have forward cabs. In addition to this safety factor, the new wrecker bumper has many practical, everyday uses in pushing disabled vehicles around the shop, in the street, and on the open road. It is especially desirable for use during winter months for starting automobiles with discharged batteries or that are stalled due to icing conditions.

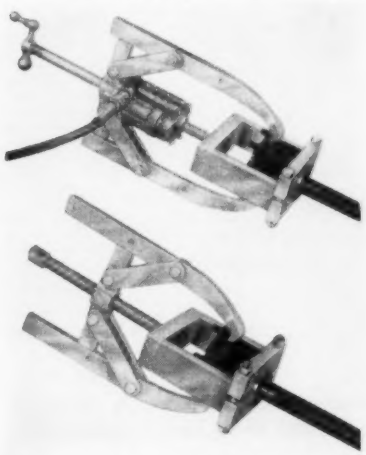
The new Holmes bumper is of rugged construction and made of the necessary strength needed for use with a wrecker unit. The bumper can be supplied with brackets to fit any standard popular truck and can be optionally furnished with a replaceable rubber facing. The height of the bumper is 16½ inches, while the height of the grill guards over the bumper adds another 15½ inches to its overall protection.

The construction of the bumper is a formed steel channel section with each leg of the channel 4 inches deep to provide space for attaching extra front end weight when, and if, needed. The standard bumper weighs approximately 190 pounds and can be easily installed on any truck for which its brackets are designed.

(Use Reply Card for Further Information)

OTC Axle Bearing Tool

Owatonna Tool Co. announces a new "bridge" tool for removing and installing flange-type rear-axle bearings without heating, torches, hammers and



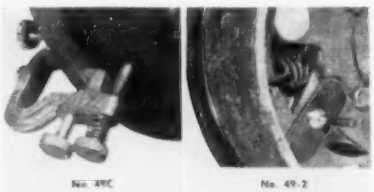
curses usually needed to pull bearings. Designed to work with either OTC's hydraulic or mechanical Grip-O-Matic pullers, there's no danger of shaft warping or scoring, bearing injury or separation when the new tool is used. Even bearings with zero-tolerance shaft-fits are quickly eased off.

This same "bridge" quickly and easily installs a new bearing on the shaft, again using an OTC hydraulic or mechanical Grip-O-Matic puller. Attachments are available to fit nearly every car, including 1958 models.

(Use Reply Card for Further Information)

New Brake Shoe Holders

The Barrett Equipment Co. announces two new brake shoe holders —for use with their Brake Dokters. The No. 49-2 Center-Plane Brake



No. 49C No. 49-2

Shoe Holder for holding the shoes in position for Brake Doktering; and the No. 49C Shoe Positioner, designed for use on all Bendix brake assemblies, including cars equipped with the new Oldsmobile type backing plates.

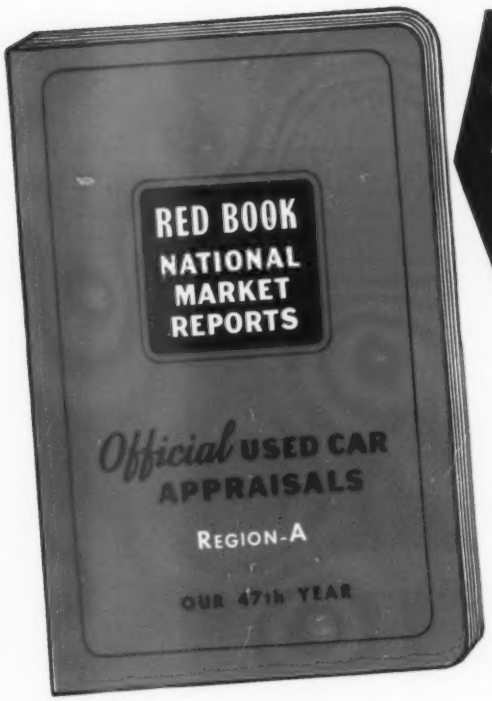
(Use Reply Card for Further Information)

Remote Throttle Control

Complete control of engine r.p.m. from any part of the vehicle and from up to 12½' away is possible with a new remote throttle control introduced by Allen Electric & Equipment Co. With this tool the throttle can be advanced or retarded instantly, or adjusted precisely and held at any engine r.p.m. with complete accuracy. A push button release built into the handle

enables the operator to instantly return engine speed to normal idle. The aircraft type control cable is long enough to permit one man operation on all service jobs that require variable control of engine r.p.m., such as transmission adjustment, engine tune-ups, and combustion analyzing, it is stated.

(Use Reply Card for Further Information)



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These are new *manufacturers' products*

Hydraulic Tail Gate for Pickups

A new elevating tail gate known as the "Weight Lifter" powered model, mounts underneath a pickup to the truck frame with four bolts (no protrusions or posts above the truck

body). It is 12 or six-volt battery-electric-hydraulic powered, with the reservoir, pump, valve and control switch all in one unit. This control package mounts in a convenient place on the side of a truck body, with only the leads to the battery to hook up. It has an 800 lb. lifting capacity, and according to the manufacturer, H. S. Watson Co., lifts this load in five seconds.

The "Weight Lifter," powered model, has a safety switch which stops the load the moment the operator takes his hand off the control lever. A "sneak-proof" valve holds the gate at any desired height, or in rigid vertical closed position during transport.

(Use Reply Card for Further Information)

Champion Adds to Line

The projected core-nose type spark plug, designed and developed by the Champion Spark Plug Co., is now available in seven types that service most overhead-valve engines, thus giving dealers the advantage of a lower inventory and a higher turnover that results in greater profits.

The advantages to the motorist using this projected core-nose type lie in the protruding insulator that reaches toward the center of the combustion chamber. Because it runs hotter during stop-and-start and slow speed driving, the low temperature fouling conditions are corrected, so that the motorist obtains faster starting, smoother idling, better acceleration, less oil dilution and more gas mileage.

At higher speeds the Champion projected core-nose types run cooler because they are in the path of the incoming fuel-air mixture. Under these conditions, the motorist can experience smoother firing, steady high speed operation, and no spark plug over-heating to cause preignition.

(Use Reply Card for Further Information)

"Do-It-Yourself" Jack Kits

JACK-PACK Manufacturing Co. have announced the new JACK-PACK "Do-It-Yourself" repair kits for every make and model hydraulic jack. The kits are inexpensive and

easy for any mechanic to install in his spare time.

Each JACK-PACK kit contains all the cups, packing, seals, gaskets, back-up washers, valves and other parts necessary to restore any hydraulic jack to trouble-free operation.

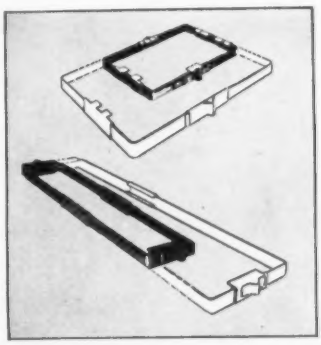
The kits will stop oil leaks, loss of pressure, load creeping, loss of full stroke and scored inefficient valves (new ones are in kit). Advantages of repairing your own jack, states the manufacturer are: no more expensive repair bills, no more shipping or crating; no more C.O.D. and freight charges, no more waiting while jack is in a distant repair shop.

(Use Reply Card for Further Information)

Adjustable Battery Hold-Down

New positive hold-down for any size battery is said to be now a simple matter with the new Adjustable Battery Hold-Down now available from Houser Engineering & Mfg., Inc.

Simple, sturdy sliding frames adjust in both length and width to grip the sides of the battery. Bolt loops and patented sliding clips can be placed on sides or ends as needed. The sliding clips have two "fingers" which project over the top of the battery to prevent it from lifting inside the



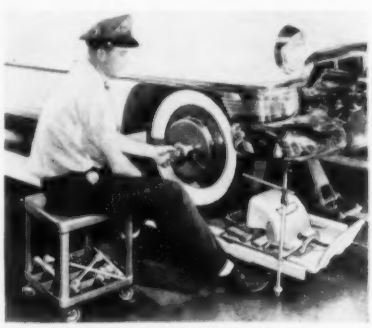
hold-down. Bolt loops which can be placed in any position permit secure installations in any convenient location.

Two Hold-Down sizes serve all battery sizes. The No. 523 for square types fits batteries from 5¾" x 9" to 9¼" x 12". No. 524 for long types adjusts from 3¾" x 11½" to 5¾" x 20½". Made without welds to break loose, the heavy-gauge steel is finished with acid-resisting paint.

(Use Reply Card for Further Information)

Bear Balance Jiggler

A new Bear "balance prover" jiggler has been announced which will better fit the lower bumpers on 1957 and '58 model cars. The new jiggler



is of shorter design to fit the new model cars and an extension tube is included to facilitate use on the older model cars as well.

The regular Bear On-A-Car balancers did not require modification since the use of 14 and 13 inch wheels in automotive production was anticipated in their original design and development.

(Use Reply Card for Further Information)

DuMont Has New Line of Testers

In addition to its line of oscilloscopes and accessories, Allen B. DuMont Laboratories, Inc., has announced a completely new line of automotive test equipment which includes an electrical tester for 6- and 12-volt systems which gives com-

plete measurements of all currents and voltages in a vehicle; an exhaust gas analyzer for indicating overall performance of the fuel system operation; a vacuum-pressure gauge for measuring intake-manifold vacuum and fuel-pump pressure; a compression gauge, and a power timing light which automatically operates from either a 6- or 12-volt battery.

Also included are a mobile stand, which may be purchased separately, or with one or two drawers, and an instrument rack for the mobile stand, which provides for sloping-shelf mounting of instruments.

(Use Reply Card for Further Information)

Graymills Mist Coolant Systems

Graymills Corp., manufacturers of coolant pumps and pumping units, have announced the addition of a new mist coolant system for tools in jobber machine shops that require coolants; such as valve grinders, milling machines and small lathes. These Mist Coolant Systems produce the cooling effect by evaporation of the liquid and the blast of air, and there is no recirculation of the liquid as in other coolant systems.

The systems are of rugged construction with corrosion-proof, heavy-duty moulded polyethylene containers. *Dual outlets* with precisely machined nozzles give a fine narrow cone spray for maximum cooling and air economy.

The Mist Coolant Systems are available in two standard sizes—1 gallon and 2½ gallon—each with *dual* outlets as standard equipment. A high quality needle valve controls the flow of air into the manifold and through the nozzles. A selector control on the manifold permits the use of one or both outlets and also regulates the flow of coolant to the nozzles. The intake tube has a 2⅝" diameter fine mesh strainer which "snaps" off for easy cleaning. The large area practically eliminates the possibility of clogging.

These systems work equally well with water, coolants, alcohol, solvents or oils, and the units are translucent so that the liquid level can be seen at all times without worrying about floats or depth gauges.

(Use Reply Card for Further Information)

Standard Fuse Holder

Standard Motor Products, Inc., has released to the field a new Fuse Holder, FH-1, which can be used for all 6 and 12 volt systems.

This new Fuse Holder can hold

every automotive fuse of ¼" diameter. It provides extra protection for the vital electrical accessories of the automobile. FH-1 is easily installed (no soldering necessary) and simplifies inspection or replacement of fuses.

Twelve Fuse Holders are mounted on a colorful display card which can be shown on the counter or hung up on the wall.

(Use Reply Card for Further Information)

One-Inch Micrometer

A new outside micrometer caliper of one-inch capacity that combines strength, rigidity and lightness with fine precision features is being offered at a moderate price by The L. S. Starrett Co.

The frame of the No. 436 Series Outside Micrometer Caliper is specially forged and ribbed for extra strength and tapers to the anvil to permit use in narrow slots and tight places. Finish on the frame is smooth black enamel for easy clean-up while the thimble and sleeve have a hard, long-wearing, multi-plate Satin Chrome Finish that eliminates glare, resists rust and stains.

Anvil and spindle faces are hi-micro-lapped to a mirror finish. Also available with Carbide faces.

The spindle is made as one piece for extra rigidity with threads hardened, stabilized and ground from the solid. The large diameter thimble and sleeve have easy-to-read, distinct black figures and graduations against Satin Chrome Finish with every graduation numbered for quick reading and positive identification. Decimal equivalents of 8ths, 16ths and 64ths are conveniently placed on the thimble.

The new micrometer is furnished with or without a lock nut which makes it possible to lock the micrometer at any setting. It is also available at additional cost with a ratchet stop at the end of the thimble or with a friction control built into the thimble.

(Use Reply Card for Further Information)

"Snappy" Auto-Gun

The Automotive Division of Snappy, Inc., announces the "Snappy" Auto-Gun for cranking, starting and stopping any 6/12-volt engine from under the hood (or while vehicle is on a hoist).

According to the manufacturer, this

new tool has more than 21 uses around the shop, and is a perfect companion for use with the shop's present testing equipment.

The pistol-shaped tool is made of high impact Styrene and the four Neoprene lead wires are of four different colors with the wiring legend permanently embossed on the handle of the gun.

(Use Reply Card for Further Information)

These are new *manufacturers' products*

Battery Condition Tester

This new Hoyt No. 655 battery condition tester, being offered by the Burton-Rogers Co., has an easy-reading, self-explanatory, 4" diameter D.C. voltmeter for precision testing all 6-12 volt batteries.

The expanded scale, readable to

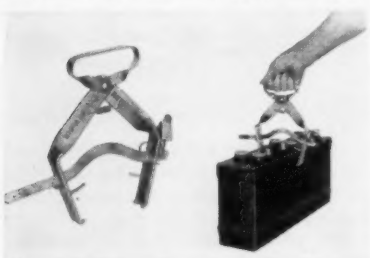
1/100th of a volt, has clearly defined color areas indicating battery condition by three simple tests: no-load method, load method using starter, and proper setting of voltage regulator.

Features of the tester are a rugged, precise D'Arsonval meter movement; a retractable coiled cord; a unique needle sharp prod, fully adjustable from 2½" to 4½" for testing any cell of a 6 or 12-volt battery; a special rubber shock absorber on the prod handle; and a convenient hanger on the back of the chromium-plated meter case that makes it easy to handle on a battery filler box.

(Use Reply Card for Further Information)

Cam-Lock Battery Carrier

The Wiora Cam-lock Battery Carrier being offered by Better Specialties, Inc., is of the tong type, and con-



structed of heavy, case-hardened, cold rolled steel, heavily plated for protection against rust. The tongs are ⅞" wide by ⅛" in thickness, with grip claws at the ends for gripping either 6 or 12-volt batteries under the rim. A short distance from the claws are prong stops which rest on top of the battery edges and aid in positioning when preparing to lift.

Joining the tongs is an adjustable ratchet bar which goes through the tongs and is equipped with a spring. A cam lock secures the tongs once they are positioned, and a comfortable handle permits easy, well balanced lifting.

(Use Reply Card for Further Information)

Tool for Mating Brake Shoes

In the interest of more dependable and safer brakes, Grigg Specialty Tools have added a new brake service tool to their line of equipment—the function of which is to mate concentrically Bendix type brake shoes to

the particular drum in which they will function on the car.

By using the new tool, the manufacturer claims that mechanics can quickly and easily overcome such troubles as hard pedal, fading brakes, diving and erratic brake action.

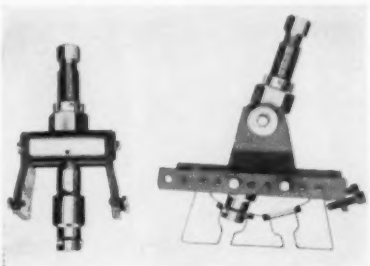
According to the manufacturer, the new tool performs a service not heretofore done, and it has therefore named it "The Missing Link." Descriptive literature, along with a copy of "The Story That Has Never Been Told," which describes in detail this new tool and how concentric mating of brake shoes can spell the difference between a good brake job and a bad one, is yours for the asking.

(Use Reply Card for Further Information)

Valve Seat Ring Puller

Valve seat rings set at an angle in valve-in-head engines can now be removed as easily as any other valve seat ring by using the new universal valve seat puller, being offered by the Bishman Manufacturing Co.

The yoke of this new tool is built in 3 parts. The two legs can be reversed to give a wide or narrow spread to fit the head or block being worked on. The cross piece holding the removing tool can be swiveled to any angle and locked in position. A pilot is provided



to locate the tool in correct relation to the valve stem guide so that the puller head will be accurately centered. The removing points are expanded under the ring which is then pulled out without marring the counterbore by tightening the lower hex nut.

The tool is furnished with 2 puller heads providing a range from 1⅛" to 2" inside diameter and additional heads for inside diameters from 15/16" to 3¼" are available.

(Use Reply Card for Further Information)

Stout-Boy Stands

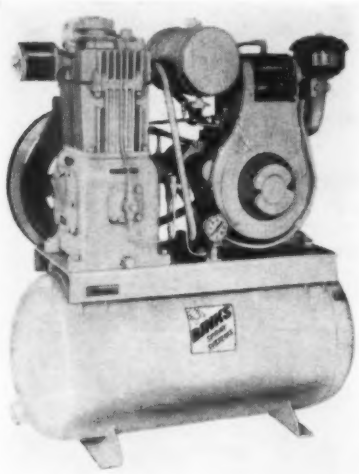
Hein-Werner Corp. announces a new line of Stout-Boy Stands designed to properly support vehicles for safer under-body work. Heavy-duty

steel construction and basic wedge designs assure maximum supporting safety in the three rated capacities. Spring-actuated pawls engage ratchet teeth in the adjustable post to meet a variety of load height requirements. The stands are available in 2, 5 and 7 ton capacities.

(Use Reply Card for Further Information)

Compressor for Tire Service

A new compressor unit is announced by the Binks Mfg. Co. which is ideal for truck tire servicing. Known as the Model 33-1039, the two-stage tank-mounted unit has a 30 gallon tank built to ASME specifications for 200



lbs. working pressure. Standard tank pressure from 165 to 175 psi is maintained by a VD constant speed unloader.

The loadless starting unit has a totally enclosed, dustproof crankcase and is equipped with a combination intake filter and silencer.

The unit is powered by a standard, 7.5 h.p. gasoline engine with a speed of 2450 r.p.m. at full load. Units with electric starters include 12 ft. length of battery cable to permit attachment to truck battery.

(Use Reply Card for Further Information)

Spin-Resistant Differential

A new improved type spin-resistant automotive differential which provides increased traction on snow and ice, enables a motorist to pull out of mud and sand holes, reduces skidding on curves, diminishes swerving on rough, crowned roads, and reduces tire wear due to wheel bounce has been announced by the Warner Automotive Division of Borg-Warner Corp.

The new unit, now under test by several of the major auto manufacturers, is said to be of simpler design and consists of fewer parts than others of this type now on the market. It is readily interchangeable with most existing conventional differentials and, according to the maker, will provide smooth completely automatic operation under all kinds of traction conditions. Unlike other differentials of this type, the Warner unit is said to be designed so it will never cause full locking of one axle shaft, a malfunction which has resulted in some apprehension on the part of car owners using other differential models.

Here is how the new differential works: When one rear wheel has more traction than the other, the new Borg-Warner unit automatically delivers the major portion of the engine power or driving effort to the wheel with the greater traction. At the same time, the wheel with the lesser traction is smoothly "braked" through the action of pre-loaded cone brakes and side gear thrust.

When traction is equal at the rear wheels, as in normal driving, the new differential operates as a conventional unit and the motorist is unaware of any difference. Under these conditions, equal torque is delivered to each wheel.

(Use Reply Card for Further Information)

Test Lead Kit

A 3-unit test lead kit designed to simplify and speed electrical testing by "jumping" any part of the elec-

trical system quickly and easily, is announced by Auto-Test, Inc. The kit consists of three handy leads in 12", 18" and 24" lengths, with each lead equipped with 1½" cadmium plated, color coded, alligator clips at both ends.

(Use Reply Card for Further Information)

Push Rod and Tappet Carrier

Every good mechanic knows that the valve push rods and lifters must be installed the same way that they

are removed. To facilitate keeping these parts in proper order and together, Wohlert Corp. is offering this valve push rod and tappet carrier to hold and keep valve push rods and hydraulic lifters together after being removed from the engine.

(Use Reply Card for Further Information)

Tread Depth Gauge

Dill Mfg. Co. presents the Model 5059 Tread Depth Gauge to eliminate guesswork in calculating the safe remaining life of used tires. In addition,

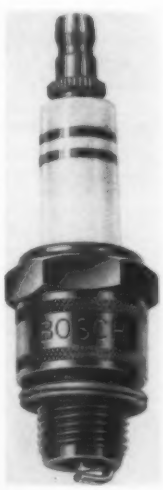
the use of such a gauge promotes customer confidence and provides a strong selling point when pointing out that tires are no longer safe.

The gauge is graduated in 1/32" increments, is of all-metal construction, and has a handy pocket clip on the case for ease of carrying on the job.

(Use Reply Card for Further Information)

Bosch Plugs Available in U.S.

Bosch spark plugs—the spark plugs that have successfully ignited the world's fastest racing cars for over half a century—are now available for the American family car and motor boat, it has been revealed by George Krieger, President of the Robert Bosch Corp. Independent service and repair stations from coast to coast will now be able to carry Bosch spark plugs as basic inventory.



Manufactured by Robert Bosch GmbH of Stuttgart, Germany, since 1902, the complete line of Bosch spark plugs has the widest productive heat range and are available for all types of motor vehicles, from scooters to trucks and boats.

(Use Reply Card for Further Information)

These are new *manufacturers' products*

Universal Compression Tester

A newly designed universal compression tester is announced by the Sun Electric Corp. which mounts a large, easy-to-read compression gauge on a moulded, pistol-grip body for

easy natural one-hand use. According to the manufacturer, it can be used in many places where less flexible testers are awkward or difficult to connect.

Leak-proof, positive fitting adapters are quickly attached to cylinders and quick-disconnect fittings between adapter and tester makes set-up easy—fast—accurate. Hoses are furnished for 14 and 18 mm spark plug openings and a long starter switch lead facilitates connection and movement about the vehicle.

Gauge is read by pushing thumb switch in handle and is scaled 0-300 psi graduated in 5 psi increments.

(Use Reply Card for Further Information)

Aerosol Rubber Lubricant

Garry Laboratories, Inc. announces a new six-ounce glove compartment

size package of Barry's Hush—a rubber lubricant in an instant spray aerosol container.

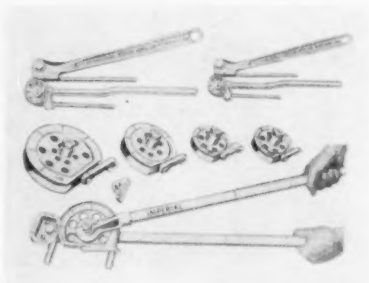
Introduced just eight months ago, in twelve-ounce containers, this clean, easy to use product is said to instantly hush squeaks in doors, trunks, spring covers, steering columns and in all rubber components in automobiles. In addition, Hush is also said to stop binding and sticking of car windows and prevent weather stripping from sticking or freezing. The low freezing point and high melting point characteristics of this product, make it suitable for satisfactory use in any climate.

(Use Reply Card for Further Information)

Combination Tube Benders

Combination tube benders of a new, improved design which bend both hard and soft tubing and handle from 2 to 7 sizes are now being offered by The Imperial Brass Mfg. Co. Sizes of tubing bent range from ¼" O.D. to ⅞" O.D.

The new benders make bends up to



180° and can be used for copper, aluminum, steel or stainless steel tubing. Benders for 4 or more sizes of tubing are furnished in metal kits. All are being identified by the Imperial "Blue Dot" emblem signifying that they bend both hard and soft tubing.

The benders are adapted for bending the various sizes of tubing by changing the forming wheel and the shoe. Complete data is provided in Bulletin No. 3078 available from the manufacturer.

(Use Reply Card for Further Information)

Non-Vented Caps

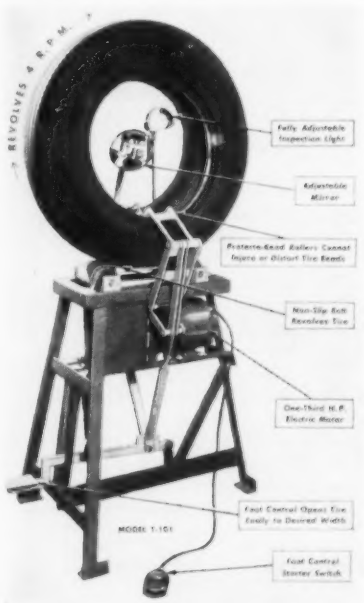
The Stant Mfg. Co. announces two new non-vented caps required to pre-

vent leakage on 1958 Chevrolet and Pontiac cars. The new non-vented G-38 fenderwell type is of zinc plated steel with "floating seal" construction . . . fits size "A" with standard cams . . . *For use only on cars having self-vented tanks.* The new G-81 non-vented "press-to-lock" type is also *for use only on cars having self-vented tanks.*

(Use Reply Card for Further Information)

Automatic Tire Spreader

Temco, Inc. announces a tire inspection spreader specifically designed for use with tubeless tires. A mirror system allows the operator to view both sides of the spread tire at once. Unique


REVOLVES 4 R.P.M.
Fully Adjustable Inspection Light
Adjustable Mirror
Protecto-Bead Rollers Cannot Injure or Distort Tire Beads
Non-Slip Belt Revolves Tire
One-Third H.P. Electric Motor
Foot Control Opens Tire Easily to Desired Width
Foot Control Starter Switch
MODEL T-101

protecto-bead rollers do not strain, distort, or injure the bead sealing rings or inner liner. Tire is spread and deflected in a manner which enables the operator to detect small puncture holes and injuries which may otherwise be missed.

Power driven—the Temco inspection spreader rotates tire one full turn in 15 seconds. Starting and stopping is controlled by a foot operated control at the discretion of the operator. A ratchet hand operated model is also available.

The unit handles all sizes of passenger car tires, is lightweight and portable—can be used anywhere tires are sold, serviced, or inspected.

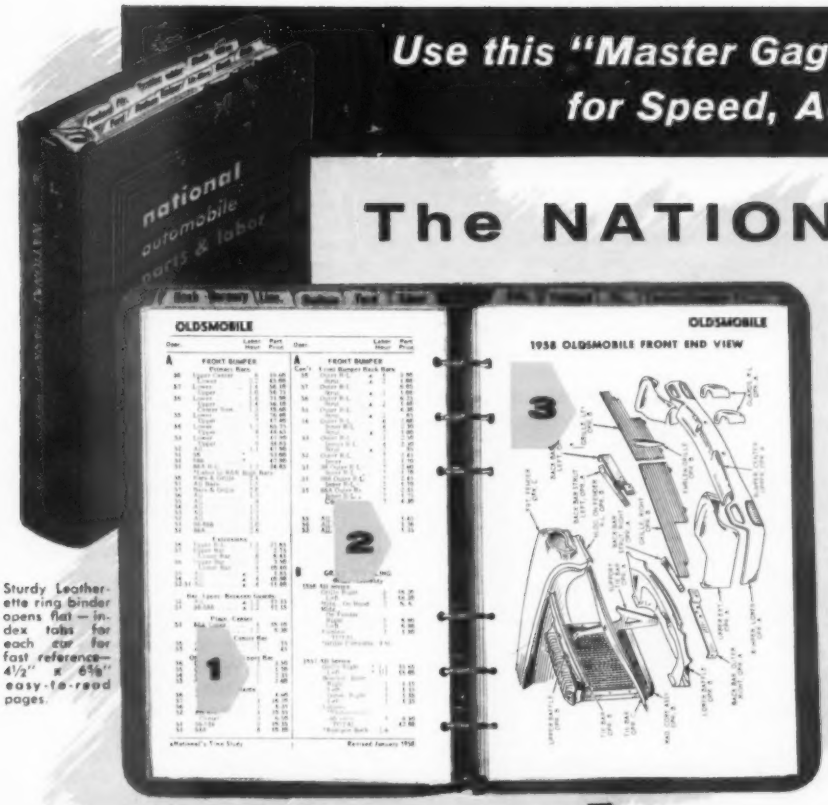
(Use Reply Card for Further Information)

Say You Saw It In
Automotive Service Digest

Use this "Master Gage" for Speed, Accuracy, Profit

The NATIONAL AUTO PARTS & LABOR MANUAL

The 3-in-1 master service



Sturdy Leatherette ring binder opens flat — index tabs for each car for fast reference — 4½" x 6⅝" easy-to-read pages.

Most Complete Service at the Lowest Cost $16.50

With this "master gage," you have *a precise check* on parts prices and labor charges — no guessing, no waste of time with catalogs and mathematics. For just $16.50 you have National's P & L Manual always at hand — the latest figures, illustrations, exploded views, including complete up-to-the-minute replacement-revision service that normally totals 15 mailings of more than 1300 pages annually.

Now! Separate Sections for Collision and Mechanical

For easier-to-use reference, National's P & L Manual is divided into two "fast find it" sections: (1) *Collision Section*—with all operations arranged in logical sequence. (2) *Chassis Mechanical Section*—covering all other repair services.

More than 50,000 Users

Year after year, in excess of 50,000 shops, garages, dealers and insurance adjusters subscribe for and rely upon National's P & L Manual. This nationally recognized "master gage" is their dependable authority for precise estimating and billing — and it is kept up-to-date constantly.

So if you want to be sure of *profits in your service and repair departments — in your body shop* — subscribe now for National's quick-reference, dependable P & L Manual. Complete satisfaction is guaranteed.

NATIONAL MARKET REPORTS, INC.
900 S. Wabash Ave., Chicago 5, Ill.
AUTOMOTIVE PUBLICATION SERVICES SINCE 1911

1 LABOR CHARGES

*Official factory time studies** expressed in hours and tenths, automatically figured at your hourly rate. No arithmetic — no chance for error. Covers all domestic cars.

2 PARTS PRICES

Factory list prices in the separate Chassis Mechanical Section cover all current makes, all models for the past 8 years — hardtops, convertibles and station wagons included.

3 ILLUSTRATIONS

For faster body shop estimating and billing, the separate Collision Section shows exploded views of front and rear suspensions, grilles, power steering — front sheet metal, including sub-assemblies and bumper — body diagrams, indexed by make.

* Where no factory flat rate exists symbol ▲ indicates that labor hours are based on National's field survey.

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Please enter our order for 1-year's service as indicated below, subject to your 30-Day free trial guarantee on National's P & L Manual:
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  - ☐ (in combination with P & L Manual) ..... $ 3.50

☐ Check encl. ☐ We'll pay postman on delivery (plus charges)

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City _____ Zone _____ State _____

AD.

Pacific Automotive Show . . .

(Continued from page 49)

then prohibit, or otherwise make it impossible for wholesalers to resell their products to their respondent retailer outlets. He cited this as an example of the association's all-out effort to have its convention program conform to the basic needs of automotive wholesalers.

Topics of interest at the opening session will include: "State of the Industry," by MEWA President Jay T. Davis; "Welcome to PAS," by P. Ted Johnston, president of the 1958 Pacific Automotive Show, who will be introduced by J. Leonard Gibson, PAS show manager; and "MEWA Doings at Washington," by James W. Cassedy, MEWA general counsel.

Among major convention participants in the MEWA convention sessions will be Ray Barnett, *Jobber Topics*, on redistribution and warehouse distribution as applied in the automotive industry; Carl B. Dietrich, *Jobber Products News*, on "Prepare Now for the Years Ahead," before the Young Executives Group banquet meeting; William C. Herbert, *Southern Automotive Journal*, on "What Car Dealers Are Thinking"; Frank O. Bregnard, president, Automotive Mechanics Institute, whose address, "Teaching the Trade About Modern Cars," scored a big hit at the 1957 Boston and Miami national conventions of MEWA; and J. P. Farber, vice president, Chapin-Owen Co., Rochester, N. Y., MEWA Director, on "What Price-Volumitis."

Howard Eves, immediate past president of the Independent Garage Owners of America, will point up IGOA-MEWA cooperative program to assist the independent garage operator; Willis E. Stone, president of the American Progress Foundation, which is dedicated to fair, equitable and sound taxation; S. R. Robinson, advertising manager, Grey-Rock Div., of Raybestos-Manhattan, Inc., on "How Wholesalers Can Help Their Dealer Customers."

Also on the agenda will be James E. Hamilton, executive manager, California Automotive Wholesalers Association, on "Foundation of Co-operation between State and National Associations"; Albert Joseph, advertising manager of AP Parts Corp., who will present the Automotive Advertisers Council's new "AAC's First Aid and Plan Book;" Fred A. Lambert, general manager of Lambert Co., Ltd., Los Angeles, and president of the Automotive Engine Rebuilders Association, on "Current Trends Enhance Importance of Shop Operation;" and Virgil C. Smith, president, Auto Parts Co., Inc., Ann Arbor, Mich., and immediate past MEWA president, and Byron K. Fletcher, sales manager, Hastings Mfg., Co., Hastings, Mich., on "Mutual Obligations of Wholesalers and Manufacturers to One Another."

B. W. Ruark will conclude the 1958 Convention with an address on "Resetting Our Sights" in keeping with the convention formula "Blueprint for Progress."

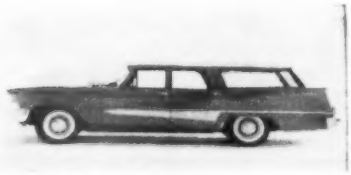
Through the efforts of the Independent Garage Owners Ass'n, all mechanics in Southern California were requested to join with I.G.O. in reaping the benefits and education of this National Pacific Automotive Show. Non-members of the Association were asked to contact their neighborhood I.G.O. member to see how they can help forward this movement.

Realizing the importance of the youth of today in the automotive future, all students participating in automotive subjects in high schools, junior colleges and trade schools will be taken to the show under the sponsorship of I.G.O. Each unit will contact the schools in their area and make the proper arrangements to have transportation and supervision for the professional mechanics of tomorrow.

HERE are quick and easy Dealer PROFITS month after month
Fast-moving
With MUSTANG
REPLACEMENT ENGINE
Outsells 'em all because it out-performs 'em all!
Buy with Confidence
POST
Recognized Value
Recommended to millions of car and truck owners by the "POST"
Now a top money-maker for every type of automotive service shop.
Quality-built and factory tested for better than new economy, power and performance.
VERY SPECIAL
Premium Quality FORD's and MERCURY's at no additional cost!
Profit-making opportunities are tremendous for those handling and installing nationally-famous MUSTANG REPLACEMENT ENGINES. Nationwide acceptance, complete lines, superior quality, sensational performance and enthusiastic customer satisfaction enable dealers to build more volume . . . more profits faster and easier. The remarkable, trouble-free MUSTANG is precision-built through and through with premium quality parts.
MUSTANG REBUILDERS Inc. GARLAND, TEXAS
Ask your jobber for FREE LITERATURE and complete MUSTANG PROFIT STORY
MUSTANG ENGINES Garland Texas

New Station Wagon Announced by Plymouth

A new 4-door, 6-passenger Deluxe Suburban station wagon has been added to Plymouth's 1958 line of cars, bringing to 14 the number of station wagons offered this year by Plymouth, including two-door, four-door, V-8 and six-cylinder options.



Plymouth's new Deluxe Suburban Station Wagon.

Like the other models in Plymouth's '58 station wagon line-up, the 4-door DeLuxe Suburban is built on a 122" wheelbase and provides a 10-foot cargo deck with nearly 100 cu. ft. of storage space. It may be ordered with a locked luggage compartment which permits luggage, tools or other valuables to be placed under lock and key and completely out of sight.

The new model is available with 6-cylinder or V-8 engine options.

Loss of Oil Pressure Due to Wrong Gasket

According to a recent De Soto Service Bulletin, loss of engine oil pressure may be encountered on 1958 De Sotos if an incorrect oil pump mounting gasket is installed between the pump and engine block.

Early in production, a revision was made in the oil pump (Part No. 1737618) used on 1958 De Soto Turboflash engines. The later built pump is readily identified by the addition of an "O" ring seal groove in the rotor shaft housing that is part of the pump body.

The pump mounting gaskets used on early and later built pumps *are not interchangeable*. Gasket Part No. 1737730 can only be used on early built pumps; and Gasket Part No. 1855327, with the center cut-out, must be used on later built pumps along with the "O" ring seal (Part No. 1855328). If loss of oil pressure is experienced, remove the oil pump and inspect to make sure that the correct gasket is installed.

Air Coil Ride Available On Rambler, Ambassador

An unique and low priced air-suspension system which combines air bellows with long coil springs has been announced by American Motors Corp.

The new rear-wheel suspension, called Air Coil Ride, is now available as optional equipment on all Rambler and Ambassador models, except the Rambler American.

Main benefits attributed to the fully automatic system are: (1) Level ride regardless of load; (2) better control on severe bumps; (3) improved stability when cornering, and (4) smoother over-all ride.

The American Motors system is said to be the only one which has springs combined with air bellows, which, according to the manufacturer, gives the car an auxiliary suspension system in the event of an emergency. Most of the weight of the car when empty is carried by the steel coil springs. As load is added, the leveling valve senses the change and air pressure is increased automatically so that the air springs carry the added weight, thus keeping the car level.

Check Position of Louvers On Rear Window Defrosters

If the owners of 1958 DeSotos complain of the rear window defroster not operating efficiently, the trouble can be quickly remedied by removing and reinstalling the air distribution cover (located on rear shelf of trim panel) so that the louvers point toward the *front* of the car.

PROFIT . . .
BY OUR EXPERIENCE!
KAL-LITE
KAL-TACH
ASK YOUR JOBBER!
KAL-TUNEMASTER . . . the tune-up tools with the built-in know how. Actually create extra selling opportunities . . . extra profits. New free booklet tells how.
KAL-DWELL
KAL-SPARK
KAL-REG
WRITE FOR HELPFUL FREE BOOK, "PROFIT BY EXPERIENCE" . . . tells from actual experience how to turn common car "complaints" into sales of tune-up, replacement parts, service and accessories.
PROFIT BY EXPERIENCE
ASK FOR BOOKLET F-65-A
KAL-EQUIP COMPANY
BOX 567
KALAMAZOO, MICHIGAN

Literature:

manuals, catalogs and charts

most items are yours for the asking

U-JOINT SERVICE . . . This illustrated 16-page booklet covers all the servicing procedures for Spicer, Mechanics, Detroit, Cleveland, and Blood Universal joints, and is complete in every detail. Step-by-step instructions, accompanied by detailed photos, make it profitable for every service shop to cash-in on the growing market for the service and replacement of universal joints.

In a key section, the booklet gives accurate instructions on how to identify the manufacturer and series of any universal joint and how to determine the proper part name used in ordering replacements.

Write to: Dana Corporation, Parts Div., 253 Waggoner Blvd., Toledo, Ohio.

LAMP AND FLASHER SPEC CHART . . . A new 1958 lamp and flasher servicing guide, an 18-page, multicolor, "flip-style" chart, is available which lists the complete lamp and flasher specifications for all domestic passenger car and truck models from 1940 through 1958, and includes a section devoted to American lamp specifications for late-model foreign and sports cars.

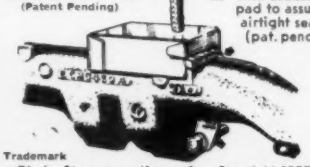
Featured in addition to the thousands of specification listings are special sections detailing the recommended methods to be used in installing and aiming replacement sealed beam headlamps in both 2-lamp and 4-headlamp systems. In addition, instructions are given on how to service direction signals, as well as illustrated directions for installing the many interior lamps used on today's automobiles.

Write to: Tung-Sol Electric, Inc., 95 Eighth Ave., Newark 4, N. J.

PHOTO SHOWING MANNER IN WHICH THE BPS CHOKE-STOVE IS MOUNTED ONTO AUTOMOBILE MANIFOLD.

choke-stove
(Patent Pending)

Exclusive "contour-fit" with asbestos pad to assure airtight seal. (pat. pend.)



Trademark

Copyright 1957

Choke-Stove mounting strap. (Uses one manifold bolt.) No holes to drill.

STOP CARBURETOR TROUBLE
ON FORD, LINCOLN, MERC, OLDS, CHEV.

Fits all 1955-57 Ford Products, 1957-58 Chevrolet, 1956-58 Oldsmobile.

Forget original heat tube. $5.95 LIST

Eliminates . . .

- Sticking choke
- Plugged air passages
- Wasted gas
- Complete carburetor failure

Send name, address of your jobber.
We pay all freight.

BRAKE PARTS SPECIALTY
1914 W. Washington, Los Angeles 18, Calif.

BRAKE SERVICE BULLETINS . . . 4-page condensed service bulletins covering brake servicing problems, new car data, brake service promotion and how-to-do-it tips.

Write to: Ammco Tools, Inc., 2100 Commonwealth Ave., North Chicago, Ill.

TRUCK PARTS . . . A new 128-page Delco-Remy popular service parts catalog for trucks is now available which is divided into four sections for easy reference. The sections cover (1) Distributor—Ignition Parts (2) Generators and Parts (3) Starting Motors and Parts (4) Illustrated Section. Heading each section are pages carrying "exploded" line drawings of the assembly, from which mechanics can immediately identify the parts needed.

In the generator section is listed several optional equipment generators with their rated ampere capacity, showing what Delco-Remy equipment is available to serve the individual truck or fleets' electrical requirements.

The illustrated section carries actual photographs of the more popular parts, catalogs, service handbooks, ignition parts cabinets, along with product information.

Write direct to: United Motors Service, Division of General Motors, Detroit 2, Mich.

AIR STARTING MOTORS . . . for starting Diesel, gasoline and natural gas engines are described in a new 20-page bulletin, which also contains detailed specifications and mounting dimensions on the company's 34 models. Approximately 500 popular engines by 25 engine manufacturers are listed, with the proper air starting motor shown for each engine. In addition, easy-to-follow instructions are included for selecting the correct motors for unlisted engines.

Write to: Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., and ask for Form 5094D.

WELDING GUIDE . . . 40-page booklet gives on-the-job reference for all types of welding. Tells you *what* rod to use for any job, *how* to use each rod, *what* amperages to use, plus the hardness and chemical content of every Marquette rod and electrode. Guide also includes a cause-and-solution trouble chart, a table of steel hardness numbers and a rod comparison chart.

Write to: Marquette Manufacturing Co., 307 E. Hennepin Ave., Minneapolis 14, Minn.

LUBRICATING EQUIPMENT . . . 32-page, 3-color catalog on automotive lubricating equipment designed "to transform any lubritorium into a sparkling showcase for sales." Also included are detailed product and engineering advantages of the company's lubricating equipment and accessories, plus complete illustrative lists of accessories and replacement items.

Write to: Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis 20, Mo.

LIFTING 1958 CARS . . . A Data File booklet now available gives the results of car lifting tests performed on all '58 models on all types of hoists—single post and 2-post free wheel; 4-post electric; roll-on and "Frame-Kontact." The published file contains facsimiles of actual reports made by research engineers covering chassis and body design, weight distribution, wheelbase and tread dimensions and under-body pick-up points recommended by certain car manufacturers.

Write to: Globe Hoist Co., E. Mermaid Lane at Queen St., Philadelphia 18, Pa.

You may want this information and most of it comes to you free. Just write to the name which appears following the listing and your request will get prompt attention. To be sure of getting the item you want mention that it is the one listed in AUTOMOTIVE SERVICE DIGEST.

TIRE INFLATING . . . A new catalog describing nine models of the ECO Tireflator stresses the importance of having up-to-date tire inflation equipment to increase sales of tires, batteries and accessories. The catalog shows how the equipment pays for itself by boosting profits.

Write to: Bennett Pump Division, John Wood Co., Muskegon, Mich.

BODY REPAIR PANELS . . . Latest catalog contains listing of more than 400 autobody repair panels, arranged by make, model and year, ranging from 1957 back to 1947 models. The company states that all of the body sections are high-quality, die formed and tailor-made to fit. They are said to require no cutting forming or metal working of any sort.

Write to: Schofield Mfg. Co., 1140 E. 222 St., Cleveland 17, Ohio.

HEADBOLT HEATERS . . . Applications of Zero-Start headbolt heaters for all 1958 model cars are outlined in a new piece of literature which lists the headbolt heater model recommended for each '58 automobile engine, as well as installation instructions. Where headbolt installation is impractical, the literature advises use of tank type heaters.

Write to: Phillips Mfg. Co., 2816 Aldrich Ave., S., Minneapolis 8, Minn.

SAW BLADE CHART . . . This wall chart lists the various sawing factors affecting cutting rate, tool life and finish; shows the steps to proper blade selection and lists the recommended cutting rates for carbon steel and high-speed steel saw bands and the proper tool velocities for cutting 48 metals ranging from alloy steels to nickel base and titanium alloys.

Write to: The DoAll Company, Des Plaines, Ill.

Sensational NEW

FAST DRYER that makes PAINT JOBS Profitable!

Three switch control operates all 7 bulbs on any combination.

TRIPPE SCORES AGAIN with NEW "IR-7"

Effective in Drying The new Epoxy resins.

Here's a fast action infra-red dryer on a stable 25" circular base with MAN SIZED Control Knobs and Handles for quick adjustments. Heavily wired for 115/130 Volts.

Call Your Jobber TODAY or Write us NOW!

TRIPPE MFG. COMPANY, Dept. C-3
133 N. Jefferson St., Chicago 6, Ill.

Calendar of Automotive Events

1958

Feb. 18-19—MEWA Convention, Statler Hotel, Los Angeles, Calif.

Feb. 18-19—NSPA Convention, Ambassador Hotel, Los Angeles, Calif.

Feb. 19-23—8th Annual National Autorama, Connecticut State Armory, Hartford, Conn.

Feb. 20-23—Pacific Automotive Show, Pan Pacific Auditorium, Los Angeles, Calif.

April 5-13—1958 International Automobile Show, New York Coliseum, New York, N. Y.

April 23-25—1958 Spring Booth Conference of Automotive Wholesalers and Manufacturers Representatives, Bon Air Hotel, Augusta, Ga.

May 11-14—Automotive Engine Rebuilders Association Convention, Sheraton-Park Hotel, Washington, D. C.

June 25-29—IGO-America 1958 Convention, Statler Hotel, Los Angeles, Calif.

Dec. 12-16—Automotive Warehouse Distributors Assn., Inc., National Convention, Muehlebach Hotel, Kansas City, Mo.

1959

Jan. 17-25—Chicago Automobile Show, International Amphitheatre, Chicago, Ill.

●

"$16,000 A YEAR SERVICING RADIATORS!"

"My first year I took in $12,000. My second year $16,000!"

McRILL AUTO SERVICE
TWIN FALLS, IDAHO

MANY MAKE OVER $10,000 A YEAR! "After 3 months we are doing $850 per mo. in radiator work and increasing all the time"—Robbins Motor Co., Marlow, Okla. "Now going at rate of $18,000 a year," says Clough, Storm Lake, Ia. You, too, can do this well!

20,000,000 Radiators Need Servicing Yearly! And with today's engine power increased, cooling capacity decreased, radiators will require more service than ever! Get your share of this huge profit potential—now!

Inland, the industry's leader, offers equipment, training, Pays-For-Itself purchase plan—advertises nationally to attract radiator servicing business to Inland-equipped shops. Mail coupon for Free Book today.

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Factory school trains you or your man quickly: Cleaning, repairing, recoring, pricing, everything! FREE to Inland customers.

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Please send new free book, "Blue Print For Profits."

FIRM _____
(PLEASE PRINT)
ADDRESS _____
CITY _____ ZONE ____ STATE _____
BY _____ TITLE _____
If dealer, make of car sold _____
Are you now operating a radiator dept.? ☐ Yes ☐ No

Removing and Replacing The '58 Windsor Oil Pan

Should you find it necessary to remove and install the 1958 Chrysler Windsor engine oil pan, or replace the gasket, the factory suggests the following procedure be followed:

REMOVAL:

1. Disconnect the battery cables and remove distributor cap.
2. Raise car on a hoist and drain engine oil.
3. Remove the exhaust cross-over pipe.
4. Loosen the rear engine mounting cap screws, *but do not remove*. Disconnect the front engine mounts from the frame cross-member.
5. Install the engine lifting fixture and raise the front end of the engine so a two inch block may be installed between each of the front engine mountings and frame brackets. Lower the engine and rest the front end of the engine on the two 2″ blocks.
6. Remove the steering gear arm, idler arm, and relay link as an assembly.
7. Remove the starting motor.
8. Remove the converter dust shield.
9. Rotate the engine crankshaft so that the number one counterweight is up and the number one crankpin is down. (In this position the timing mark is approximately 180° from the pointer.)
10. Remove the engine oil pan. Clean off the old gaskets and clean the pan.

INSTALLATION:

1. Place the engine oil pan in place just below its installed position. Install the engine oil pan end seals in their grooves. Install the new gaskets on the oil pan and fasten in place with holding devices so as to prevent damage to gaskets when placing pan into position.
2. Install the engine oil pan and start all the attaching cap screws. When screws are all in place, torque tighten to 15 ft. lbs.
3. Install the converter dust shield.
4. Install the starting motor.
5. Install the engine lifting fixture, raise the front of the engine and remove the two inch blocks from under the front engine mounts. Lower the engine into correct mounting position.
6. Neutralize, align and tighten the engine mountings. (Front and rear.)
7. Install the exhaust cross-over pipe. Align and tighten the exhaust pipe clamps.
8. Install the steering gear arm, idler arm and linkage. Torque tighten to factory specs.
9. Lower the car to the floor. Install distributor cap and connect the battery cables.
10. Fill the engine with oil to proper level. Start and operate the engine and inspect for possible oil leaks.

Plymouth Taillight Removed from Outside

Taillight assemblies on the '58 Plymouths are attached from the outside with six screws. The entire taillight assembly can be detached by removing these screws.

A vertical aluminum blade is used in the center of the taillight on all models except Suburbans, which have a chrome-plated die cast blade.

It's the Tool Set of the Year!

RIMAC **Hexset** NO. 777

TAPS and DIES

that cover the Autofront!

- **ALL DIES HEX — for use with standard wrenches. Assures positive grip.**
- **17 TAPS AND 17 DIES — to handle *all* the jobs.**
- **3 TAP WRENCHES — for efficiency in any size.**
- **2 DIE STOCKS — 1″ Hex; ⅝″ Hex.**
- **11 FRACTIONAL SIZES — ¼ to ½ NF and NC, ⅛″ Pipe.**
- **6 MACHINE SCREW SIZES — needed in the repair shop.**
- **SMART MAROON CHEST — strong, light and compact. Molded of durable polyethylene plastic.**

The RIMAC 777, new champion in the Tap and Die field, is a combination of the mechanic's favorite Hexsets No. 77 and No. 73 . . . It features all popular tools of both sets plus others that are unique to the RIMAC line and the trade. The RIMAC 777 was designed by mechanics for the garage mechanic.

Ask your jobber or write for literature.

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Please notify us 5 weeks in advance. Supply us with both your old and new address, including address label from current issue if possible. Copies we mail to your old address will not be delivered by the Post Office unless you pay them extra postage. **Mail address changes to Circulation Dept., Automotive Service Digest, 900 South Wabash Ave., Chicago 5, Ill.**

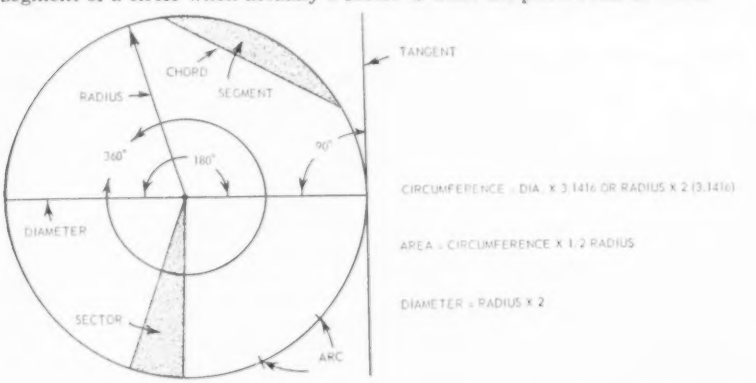
BRUSHING UP ON THOSE

EASY-TO-FORGET THINGS

Refresher course

Factors pertaining to the circle

● TECHNICAL DISCUSSIONS and descriptions many times include references to the circle or to one and, perhaps, several of the varied parts pertaining to it. Sometimes an incorrect definition is applied to a part or area of a circle and which changes the whole concept. Thus, one might refer to a segment of a circle when actually a sector is what the person has in mind.



Common references to the parts or areas of a circle are illustrated and defined as follows:

ARC—Portion of a curved line.

CHORD—A right line intersecting a curve.

DIAMETER—Any chord passing through the center of a circle.

RADIUS—A right line extending from the center of a circle or sphere to the curve or surface; the semi-diameter of a circle or sphere.

SECTOR—The figure bounded by two radii and the included arc of a circle.

SEGMENT—That part of a circular area bounded by a chord and an arc of that circle.

TANGENT—A straight line or curve meeting a curve or surface and hence having there the same direction as the curve or surface.

Speed Service, Step Up Profits

...convert your pickup to a low cost tow-truck

WITH A

WATSON TOWBOY®

Here's an easy, low-cost way to do your own towing — to pick up and deliver your own jobs for better service, increased profit. Check these TOWBOY features:

✱ **EASY INSTALLATION** on any standard ½, ¾ or 1-ton pickup.

✱ **TWO-TON CAPACITY HOIST, UNIVERSAL CRADLE** handles front or rear of all cars, including '57 models, sports and foreign cars with single accessory attachment!

✱ **CUSHIONED PROTECTION...** adjustable rubber-faced pads protect bumper, grille, lights. Solid hook-up prevents bumping, swaying; safe for high speed towing.

✱ **FAST...** a few turns of the crank lifts car and pulls it tightly into cradle, held by its own weight, in just two minutes!

✱ **LOW COST...** TOWBOY costs only $313.50* (including rear pickup bumper), or only $290.40* if you already have suitable heavy-duty bumper!

*f.o.b. nearest WATSON distributor; you install.

Why let towing profits go elsewhere? Write **today** for literature, prices on the WATSON TOWBOY!

Please address Dept. B 1

WATSON

H. S. WATSON COMPANY
Emeryville, Calif.
Toledo, Ohio

Some Interesting Facts About Fuel Injection

With several makes of 1958 cars offering fuel injection as optional equipment, mechanics can expect to run up against service on cars so equipped at any time in the future.

To straighten out some misconceptions in connection with spark plug performance on fuel injection engines, the service department of the Champion Spark Plug Co. offers the following information.

The fuel injector in no way eliminates the use of spark plugs! When used on a gasoline engine, the fuel injection system merely replaces the carburetor as a device for mixing the fuel and air in correct proportions. Spark plugs still have to be used to ignite the charge in the cylinder.

Fuel can be injected directly into the cylinders at the right instant, just as it is customarily done on Diesel engines, or it can be "dribbled" into the intake manifold close to the intake valve. This dribbling method is usually called port injection, and is the kind in most general use in factory installation of fuel injection systems.

When operating properly, a fuel injection system can greatly extend spark plug life. It is able to provide a uniform charge of fuel within the cylinder, thus eliminating an overly lean or rich mixture in various cylinders. Also, the anti-knock additives as well as the scavengers can be supplied to the cylinder in chemically correct proportions.

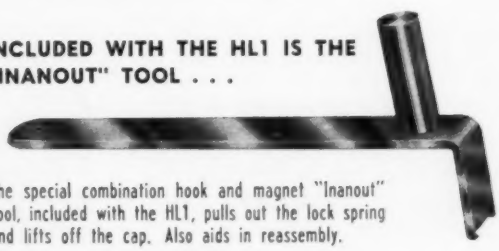
REMOVE STUCK VALVE LIFTERS IN MINUTES INSTEAD OF HOURS

Yes, the new Lisle HL1 Hydraulic Valve Lifter Tool will pull tightly frozen valve lifters from the block quickly and easily . . . will save hours on many tough jobs.

EXCLUSIVE FEATURES

- Removes All types hydraulic valve lifters.
- Spring plunger unloads lifter as the tool is inserted.
- Slide hammer action gets the tough ones—screw puller takes the really tough ones.
- Lock-on rims expand in straight line—give positive attachment to all lifter sizes.

INCLUDED WITH THE HL1 IS THE "INANOUT" TOOL . . .



The special combination hook and magnet "Inanout" tool, included with the HL1, pulls out the lock spring and lifts off the cap. Also aids in reassembly.

it's a good tool...it's a Lisle

LISLE CORPORATION
CLARINDA • IOWA

A Helpful Tip on Using Battery Fluid Dispensers

After using a Delco battery fluid dispenser, the hose clamp should never be left hanging on a nail or other metal fastener. Even though this clamp is made of an acid-resistant metal, more rapid corrosion takes place when battery fluid comes in contact with two dissimilar metals.

Corrosion of the hose clamp can release the hose, allowing the free end to fall below the liquid level in the battery fluid container. If this occurs, the entire contents may drain out, resulting in damage to any material with which it comes in contact.

When the fluid dispenser is not in use, it is recommended that the hose and clamp be placed as shown in the accompanying illustration. In this position, the clamp will deteriorate less rapidly.

Infra-red Radiant Heat . . .

(*Continued from page 25*)

Control B — Automatic operation, where unit is turned on and off by means of a thermostat located on the bottom of each unit.

Control C — Remote control for either manual or automatic operation, by remote thermostat, time clock or master switch.

To date, Mr. McGlone states there has been no maintenance cost on the units, and this is understandable, since there are no moving parts and nothing to wear out. There is no fan, no motor, no power consumption.

The units installed in the McGlone shop and showroom use natural gas and Mr. McGlone states there is a substantial savings in fuel costs, as compared with anticipated expenditures. This is probably due to the fact that no heat is wasted in ceiling and roof areas, all rays are directed downward to the areas to be heated and mechanics no longer have cold feet and numb fingers.

Say You Saw It In
Automotive Service Digest

Tests Show Steady Brake Application More Effective than Snubbing Action

The question often arises as to which is the best method of applying brakes during a high speed stop or when descending steep hills—a steady drag application, or a snubbing action?

During a recent S.A.E. meeting this subject was discussed, and the results of numerous tests were reported, which showed that a steady application is better than snubbing to slow down a vehicle making a long fast stop or descending a hill.

According to reports, the snubbing action caused the brakes to operate at a higher temperature, resulting in increased lining wear. The total work done by the brakes is the same regardless of which braking method is used. However, the *rate* of braking while the brake is applied has to be higher during the snubbing actions, because of the brake effect which is lost during the time when the brake is not applied.

The higher rate of brake action causes a higher temperature at the point of contact between lining and drum. This extreme heat, even though it lasts only a short time, causes increased lining wear. The tests showed that there was very little cooling taking place during the time intervals between the brake applications when the snubbing system was used. Actually, the peak drum temperature was lower during a steady drag application than it was during the snubbing type brake action. This lower temperature was the main reason why better results were obtained with a steady brake application.

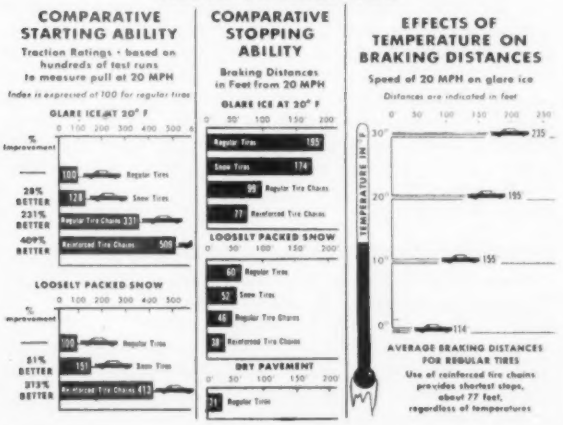
Correcting Noise or Alignment On Studebaker Instrument Board

When an inspection shows that the right or left hand end of the instrument board on the 1958 Studebakers is out of alignment, or a noise develops at this point, the factory suggests the following corrections be made.

Remove the windshield garnish moulding, right and left hand sides. Pull the end of the instrument board up to its proper position and bend the tab or extension at the extreme end of the board over the bracket on the body to hold the board in position. Using a No. 32 drill, drill through the extension or tab on the instrument board and the bracket and install a No. 6⅜" long sheet metal screw to hold the board ends firmly in position. Reinstall the windshield garnish moulding.

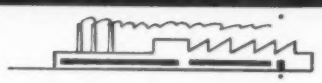
DECLARE WAR ON "OLD MAN WINTER"!

FACTS TO HELP YOU


COMPARATIVE STARTING ABILITY
Traction Ratings - based on hundreds of test runs to measure pull at 20 MPH
Index is expressed at 100 for regular tires
GLARE ICE AT 20° F
% Improvement
100 Regular Tires
128 Snow Tires
28% BETTER
Regular Tire Chains 331
231% BETTER
Reinforced Tire Chains 500
409% BETTER
LOOSELY PACKED SNOW
100 Regular Tires
151 Snow Tires
51% BETTER
Reinforced Tire Chains 413
313% BETTER
COMPARATIVE STOPPING ABILITY
Braking Distances in Feet from 20 MPH
GLARE ICE AT 20° F
Regular Tires 185
Snow Tires 174
Regular Tire Chains 99
Reinforced Tire Chains 77
LOOSELY PACKED SNOW
60 Regular Tires
52 Snow Tires
46 Regular Tire Chains
31 Reinforced Tire Chains
DRY PAVEMENT
31 Regular Tires
EFFECTS OF TEMPERATURE ON BRAKING DISTANCES
Speed of 20 MPH on glare ice
Distances are indicated in feet
TEMPERATURE IN °F
30° 235
20° 195
10° 155
0° 114
AVERAGE BRAKING DISTANCES FOR REGULAR TIRES
Use of reinforced tire chains provides shortest stops, about 77 feet, regardless of temperatures

Shop or Factory

CUT MATERIALS HANDLING COSTS!



The Frontier line of Steel Shelving is made to solve storage problems. Assembles in minutes, to help with materials handling. The enamel finish, baked on at the factory, assures long-lasting service.

Shelving • Parts Bins • Tables Benches • Service Carts

See your Frontier dealer or write direct for FREE Catalogue.

FRONTIER
MANUFACTURING COMPANY
P. O. Box 13266
Dallas 20, Texas

CHEVROLET AGENCY SAVES $10,000 BY INSTALLING PANELBLOC

A Michigan Chevrolet Agency installed Panelblocs and pocketed a big fat $10,000 saving by doing so. The cash saving was only part of the story. Dealer reports summer-like working conditions despite severe cold. Windows don't fog or ice. Mechanics were comfortable. Write for the case history on this job.

Thermobloc Div., Prat-Daniel Corp.,
12-2 Meadow St., So. Norwalk, Conn.

Please send literature and information on this Michigan Chevrolet Agency installation of Panelblocs.

Name _____

Address _____

City _____ State _____

MOST POWER PER DOLLAR!

Milwaukee

7" diameter model U-177 $84.50

9" diameter model U-199 $89.50

Heavy-Duty... Perfectly Balanced SANDER-GRINDERS

With *Exclusive* Coaster-Brake Drive that DOUBLES GEAR LIFE

- √For Sanding . . . Grinding . . . Wire Brushing
- √Ideal Speed . . . 5000 RPM
- √Powerful *Milwaukee-Built* Motor
- √Furnished with *Milwaukee's Exclusive* Flexible Spring Steel Backing Disc Assembly
- √Full Ball and Roller Bearings throughout

See your MILWAUKEE Distributor today or write for Bulletin SG-3.

MILWAUKEE ELECTRIC TOOL CORP.
5324 W. STATE ST. MILWAUKEE 8, WIS.

Selling Under-Car Parts as a Package

At the recent annual sales meeting held by MOOG Industries, Inc., St. Louis, the company introduced its new program B-E-A-M, which stands for brakes, exhaust and MOOG. The program is designed to help wholesale salesmen's effort to be more productive and offers a plan for coordinating sales efforts on all under-car lines.

The entire program is explained in a well-illustrated, easy-to-understand sales manual available to warehouse distributors and jobber salesmen. The program is unique in the annals of under-car parts selling in that it promotes other lines in addition to the manufacturer's products.

The manual provides a framework for developing a complete sales presentation on MOOG chassis and suspension parts; and to encourage the distributor to tie-in his specific brands of brake parts, lining and fluid; mufflers and tailpipes and related under-car parts. The salesman merely adapts the presentation to his needs by incorporating the specific selling features of the brands he sells.

The men behind Moog's B-E-A-M program. Left to right: Herbert C. Moog, President; Claude Suttles, Sales Manager; James B. Bushyhead, vice president in charge of sales; Hubert P. Moog, Chairman of the board.

The B-E-A-M manual explains how to use the book, shows the size of the under-car market by listing average jobs per week per shop, why these replacement parts are today's fastest growing market together with explanation of MOOG parts including ball joint tune-up kits, control arms, pivot joint kits, steering arms, idler arms and supports, king bolt kits, shock absorbers, tie-rod ends, shackles, coil and leaf springs and other related items.

Point-of-sale display materials for tying in with the B-E-A-M program is available for use at both the jobber shop levels. Space is provided for inserting the brand names on the brake and exhaust lines sold where the merchandising pieces are displayed.

According to the company, the B-E-A-M program is planned to help distributors, jobbers and shop operators capitalize on the growing trend toward a more safety-conscious motoring public. Theme of the program is "Get on the BEAM . . . sell 'safety' on every job." The company's goal is to make the under-car-safety check as acceptable a part of regular automobile maintenance as engine tune-up. Considering such a long-range view, the importance of selling under-car parts as a package becomes apparent.

Corvette Transmission Mount

Over-torquing mounting bolts used at the 1956-'57 Corvette transmission mount (engine rear mount) can result in damage to the mounting.

The two long bolts that extend downward through the mounting bracket, as well as the two bolts from the mounting bracket to transmission extension, should be installed to a torque of 25-30 ft.lbs.

Keep Transmission Cooler Tubes Clear of Engine Support Bracket

DeSoto advises that there may be instances on some of their early-built 1958 models where the transmission cooler tubes may be routed so that they contact the front engine support bracket, causing a rattle or wear on the cooler tubes.

The factory recommends the following procedure for correcting the condition: Place car on hoist and inspect routing of the tubes past front engine mount bracket and front crossmember. To equalize clearance, push the tubes up and towards left side of car, at about a 45° angle, holding the tube at the lower tank connections to prevent any strain at this point.

Recheck tubes to front crossmember clearance in case further adjustment may be necessary.

RADIATOR REPAIRMEN!

For easier, faster, more efficient service use —

LAKE RADIATOR SHOP TOOLS & SUPPLIES

Write for free Supply Catalog

AND for your PROTECTION recommend GUARANTEED

Genuine LAKE CELLULAR-TUBULAR RADIATOR CORES

Write for free Core Catalog

LAKE AUTO RADIATOR

5200 W. 130th St., Cleveland 30, Ohio
Branch—2115 E. 25th St., Los Angeles 58, Calif.

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HE WHO LAUGHS, COME WHAT MAY,

WILL LIVE TO LAUGH ANOTHER DAY

Short circuit smiles

When a man is twenty and a young lady smiles at him when passing on the street he looks himself over to see what makes him so attractive. When he is forty and a lady smiles at him, he looks around to see who is following him or looks to see what is unzipped.

★ ★ ★

Then there's the one on the program featuring the hillbilly guitarist, Clif Ewell. The announcer was supposed to say, "Clif will now sing, 'There'll be an empty cot in the old bunkhouse tonight.'"

You guessed it! He announced, "There'll be an empty bunk in the old cat-house tonight."

★ ★ ★

A quiet rancher who had just got married was driving his bride to the ranch in his buggy. Only a short while after starting, the mare pulling the buggy stumbled on a stone. "That's once," mumbled the rancher quietly, but loud enough that his wife could hear. A little farther the mare stumbled again. "That's twice," he said, a little louder this time. When the mare tripped still a third time, the rancher shouted, "That's three times," and jumped out and shot the mare.

Upset by this unexpected display of temper, his new wife gave out with a searing tongue lashing. Her rancher husband, however, seemed unmoved and heard her out patiently. When she finished, he looked her straight in the eye; his only words were, "That's once."

★ ★ ★

Customer on one end of the phone: "I sent my little boy for three pounds of cookies and he brought home less than two pounds. Did you weigh them correctly?"

Grocer: "My scales are all right, madam. Have you tried weighing your little boy?"

★ ★ ★

Boston Cream Pie is called Washington Cream Pie in Boston.

Bore: Someone who insists on telling you all about his troubles when you want to tell him about your own.

★ ★ ★

Little boy watching milkman's horses:

"Mister, I'll bet you ain't gonna get home with your wagon."

Milkman: "Why?"

Little Boy: "Cause your horse just lost all of his gasoline."

★ ★ ★

The young maiden got herself involved in a divorce case and was being questioned in court.

"So, Miss Brown, you admit that you went to a hotel with this man?"

"Yes, I do, but I couldn't help it—he deceived me."

"And how did he do that?"

"Well, he told the reception clerk that I was his wife."

"Spark's Okay!"

Given the money to pay a salesman's check, a dining car waiter paid the bill and returned with the change—a half dollar and a nickel.

The salesman fumbled for a moment, then picked up the half dollar and left the nickel.

"You should use better judgment," he said. "You should have brought two quarters."

"I suppose so," agreed the waiter, "but let's just say I gambled and lost!"

★ ★ ★

Jim had to take his wife on a fishing trip, so while she started a fire, he went out to try his luck to see if he could catch a nice batch of trout for dinner. The entire afternoon wore on, however, and Jim didn't even see a fish. Finally he returned to his wife.

"How many did you catch?" she asked.

"No fish," said Jim disgustedly, "just two right shoes."

"Two right shoes?" screamed his wife, "How come that's the best a great fisherman like you can do?"

"How should I know," Jim shouted back. "Maybe the left shoes weren't biting today!"

★ ★ ★

Chatter between two girls having late-day drinks at a cocktail party: "I swear, I don't understand how the Russians can be so nasty," commented one of them. "Just two sips of Vodka and I like everybody."

★ ★ ★

Two little rabbits were being chased by a pack of hungry wolves. One turned to the other and said, "Hey, how about stopping for a second and outnumbering 'em?"

★ ★ ★

Pedestrian: A man who has two cars, a wife, and a daughter.

★ ★ ★

An old Wisconsin farmer was showing one of his city relations some of the country sights.

"My goodness," exclaimed the urbanite, "look at all those fields, all those cattle, the splendid farm buildings, and the up-to-date farm homes. This community must certainly abound with prosperity."

"'Tweren't prosperity that built all those fine homes," the farmer said, "'Twas jealousy."

★ ★ ★

A salesman, held up in a small Wyoming town by a bad snow storm, wired his firm: "Stranded here due to storm. Wire instructions."

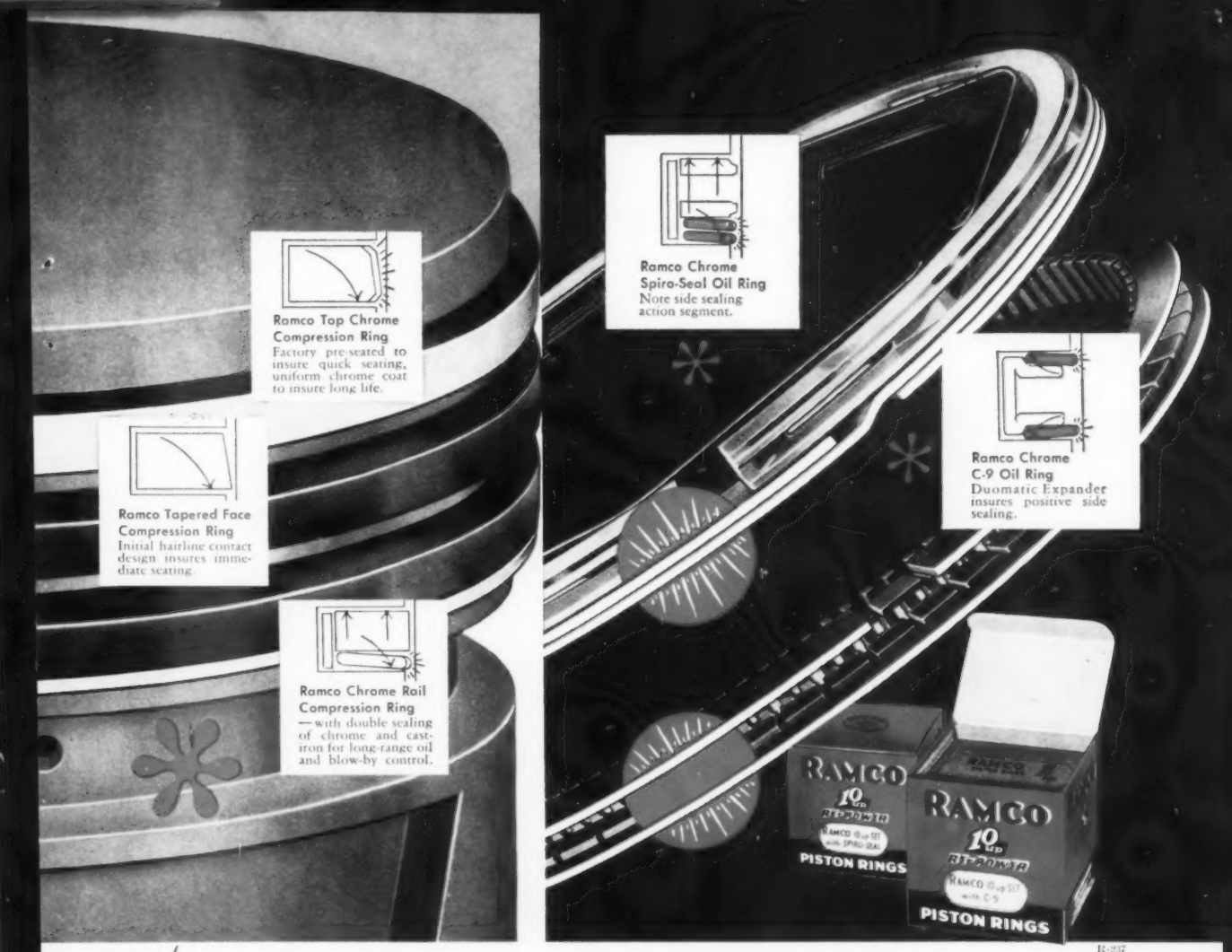
Back came the reply: "Start vacation immediately."

★ ★ ★

Tommy came home proudly showing a quarter that he said he had found in the street.

"Are you sure it was lost?" his father asked.

"Yes, I know it was," Tommy replied. "I saw a man looking for it."


Ramco Top Chrome Compression Ring
Factory pre-seated to insure quick seating, uniform chrome coat to insure long life.
Ramco Tapered Face Compression Ring
Initial hairline contact design insures immediate seating.
Ramco Chrome Rail Compression Ring
—with double sealing of chrome and cast-iron for long-range oil and blow-by control.
Ramco Chrome Spiro-Seal Oil Ring
Note side sealing action segment.
Ramco Chrome C-9 Oil Ring
Duomatic Expander insures positive side sealing.
RAMCO
10 up
PISTON RINGS
RAMCO
10 up
PISTON RINGS

R-217

be DOUBLE SURE

Only RAMCO gives you

2 CIRCUMFERENTIAL EXPANSION* Action Oil Rings

—the right one for any age engine

***CIRCUMFERENTIAL EXPANSION ACTION GIVES YOU:**

Immediate, No-Drag Seating — stops oil pumping, ups gas mileage. Chrome rails increase ring life.

Sure-Fire Oil Control—even under high vacuum deceleration conditions. Positively seals top and bottom of ring lands against "oil creep" on all piston strokes.

Automatic Adjustment to Wear — adds new car miles to rings, cylinders, pistons.

When you call your Ramco Jobber for RAMCO 10-Up Piston Ring Sets—you're DOUBLE SURE!

He'll send you the *right* RAMCO 10-Up Set for that engine—including either the Chrome Spiro-Seal or Chrome C-9, whichever is right and best for the engine—BOTH have years-ahead *circumferential expansion action!*

And, in that set, you'll get advanced RAMCO-designed compression rings, too—a select combination of top chrome, chrome rail or cast-iron types to *insure* top ring performance!

That's why—when *you* re-power any age engine—be DOUBLE SURE! Rely on RAMCO 10-Up Sets!

RAMCO 10 up PISTON RING SETS

RAMSEY CORPORATION, St. Louis 8, Mo.
a subsidiary of *Thompson Products, Inc.*

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SOMETHING TO CROW ABOUT

Here's a "ONCE-IN-A-LIFETIME" BONUS PLAN to Introduce
NEW RUST MASTER *Royal* TO YOUR CUSTOMERS

LOOK **at this Gorgeous $92.50 BENRUS WRIST ALARM WATCH**
Given Away FREE* with every 6 Cases of Rust Master Royal

WAKE UP IN THE MORNING WITHOUT WAKING WIFE

TIME BATTERY CHARGING

TIME TO GO TO THE BANK

FREE* WRIST ALARM WATCH

— Rings to Remind You —

- Sweep Second Hand
- Shock-Absorbing Movement
- Luminous Dial
- Stainless Steel Back
- 17 Jewels
- Leather Inlaid Expansion Band
- Guaranteed Accurate
- Guaranteed to Alarm on Time

HERE'S WHAT RUST MASTER *Royal* WILL DO FOR YOU . . .

Rust Master Royal with Seal-ite gets rid of rust and scale like magic, keeps new rust from forming . . . improves water circulation. Seal-ite, exclusive with Rust Master Royal, tightly seals leaks, prevents loss of anti-freeze, opens up the cooling system, prevents clogging, and lubricates the water pump to insure quiet operation. Ask your jobber for your FREE watch.

NO MUSS . . . NO FUSS . . . JUST POUR . . . NO MORE

Special Free Watch Offer . . .

This Beautiful BENRUS 17 Jewel, $92.50 Wrist Alarm Watch given away FREE with every 6 Cases of Rust Master Royal that you buy.

List Price . . . $1.95 per can (24 cans per case).

Your Profit . . . $.78 per can or $18.72 per case.

And you get the BENRUS Wrist Alarm Watch FREE with 6 Cases.

OR . . .

Special "4 for 3" Offer . . .

A 4 for 3 deal which means when you order 3 Cases of Rust Master Royal, you receive 1 additional Case FREE.

* This offer good from January 15, 1958 to June 30, 1958.

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YOU CAN'T BEAT RUST MASTER *Royal* WITH SEAL-ITE.

Rust Master *Chemical Corporation*

Manufacturers of Automotive Chemicals
56 CREIGHTON ST., CAMBRIDGE 40, MASS.